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JOURNAL OF VARIATION.

EDITED BY
J. W. TUTT, F.E.S.

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PREFACE TO VOL. VIII.

At the end of another volume we again tender our heartiest thanks do our subscribers and contributors.

The current volume of the magazine has, like its two immediate predecessors, been published in eight months. In spite of this, extra pages have had to be given to clear off accumulated material, and, at the present time, thanks to our contributors, we have a large number of important articles on hand, which will be published in due course. As we announced, however, on the completion of the last volume, we shall revert to the old monthly mode of publication with Volume ix. We much regret that we are not able at the present rate of subscription to permanently enlarge the magazine.

We have attempted to produce a fair share of readable matter for the more scientific entomologist and for the field worker. Our "Field Work Notes" for the various months will be continued in the next volume, and several well-known entomologists have also kindly promised their help in various directions. Our aim is to make the magazine a living record of what is actually being done in the various strata of the entomological world. We trust we have in some measure succeeded.

Our best thanks must be again given to Mr. G. B. Routledge, F.E.S., who has for the third time taken charge of the Special Index.

Insects The Entomologist's Record AND

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VOL. VIII. No. 1.

MAY 1st, 1896.

MIMICRY.

1.—GENERAL OBSERVATIONS. SELECTION. PROTECTIVE COLORATION. UTILITY.

By J. W. TUTT, F.E.S.

Every educated man and woman has heard of the leaf-butterflies, and, sooner or later, every entomologist, when showing his collection to a friend, is suddenly pulled up and asked to explain why certain insects resemble leaves, and how such peculiarities have arisen.

There are three ways of answering the enquirer's question, so far as we have observed :—(1) To say you do not know. (2) To equivocate, because you do not like to say you do not know. (3) To explain the matter clearly to your own satisfaction and that of the enquirer.

In order to do the latter, even in general terms, it is necessary to have some definite idea as to details one's self. The reason why certain insects resemble leaves is evident : it is to enable them to escape from enemies that would otherwise prey upon them. To explain how the peculiarities, which give them such strong resemblances to leaves, have arisen, is a much more difficult matter.

It is evident that, if we are to attempt to explain the matter, we must hazard a theory. Our theory, it must be remembered, only attempts to explain the facts. The use of a theory is to offer a probable explanation. If it explains all the conditions we observe, it may be that the theory is really the true explanation of how the facts have been brought about. So soon as the theory ceases to be in accordance with observed facts, so soon the theory must be discarded.

Those who have attempted to explain the origin of mimicry have done so from two diametrically opposite standpoints. The first, as exemplified by Darwin and Wallace, have looked upon the external forces of natural selection as the cause. Others, as Nägeli and Askenasy, have looked upon it entirely as the result of forces at work within the organism.

Neither of these alone entirely satisfies the conditions, but a combination of the action of certain internal forces, with the principles of natural selection as enunciated by Wallace and Darwin, gives a very satisfactory explanation of the phenomena observed. It appears to us that internal forces must be considered as giving rise to variations of the structure, so as to allow of the necessary modifications. The internal force is, therefore, in a manner, creative. The external force acts selectively on the organism, and determines the particular

direction in which the modifications shall take place, so as to produce the results necessary to adapt the individual to its environment. The external force (natural selection) is, therefore, directive.

Professor Weismann has recently discussed this matter, but in his attempt to prove Nägeli and Askenasy wrong, he appears occasionally to refuse to internal forces, powers which he afterwards grants, whilst, in order to fortify the part that external forces play, he ascribes to them a creative power,* which appears to us to be hardly in accordance with the facts. Yet, taking his paper as a whole, the views he puts forward appear to resemble those above suggested. The variations (from which all possible modifications arise), he asserts, are inherent in the germ, whilst towards the end of the paper he says that utility guides variation, which appears to be practically synonymous with the position we have enunciated.

With these preliminary notes, necessary to explain certain criticisms we may offer from time to time, it may be well to briefly run over the latest pronouncement on the subject.

Referring in general terms to the principle of selection, Weismann calls attention to the fiery criticism through which the principle has passed, and refers to Huxley's well-known statement that "Even if the Darwinian hypothesis were swept away, evolution would still stand where it is," and suggests that Huxley would thus appear to "have regarded it as not impossible that the hypothesis should disappear from among the great explanatory principles by which we seek to approach nearer to the secrets of nature." Weismann, however, boldly asserts his belief in the principle, and sees in the doubts that have been raised concerning the principle of selection only a natural reaction from its over-estimation. "The principle of selection was not over-rated in the sense of ascribing to it too much explanatory efficacy, or of extending too far its sphere of operation, but in the sense that naturalists imagined that they perfectly understood its ways of working, and possessed a distinct comprehension of its factors, which was not so." On the contrary, he asserts that, the deeper naturalists penetrated into the working of selection, they found that although its action upon the whole was clear and comprehensible, yet, in detail, so many formidable difficulties were encountered which they were unsuccessful in tracing out so far as related to the actual details of the individual process, and, therefore, in fixing the phenomenon as it actually occurred. The difficulty, as Weismann points out, is that we do not know how great a variation must be to have a selective value, how frequently it must occur to acquire stability, nor can we assert in scarcely a single actual instance in nature whether an observed variation is useful or not, and he further indicates the difficulties in getting the necessary facts relating to these points, suggesting that it seems almost impossible to observe sufficient individuals of a species in all their acts of life, and to observe these acts with a precision enabling us to say which variation did or did not have a selective value, *i.e.*, was a decisive factor in determining the existence of the species.

* "The opposition of our own day contends that selection cannot create, but only reject, and fails to see that precisely through this rejection its creative efficacy is assured" (Weismann). We prefer not to regard this as creation of new, but as modification of existent, conditions.

"At the best," he says, "we can reach only a probable inference." Even in the most indubitable cases of adaptation, *e.g.*, those that occur in the striking protective coloration of butterflies, the sole ground of inference that the species upon the whole is adequately adapted to its conditions of life, is that the species appears to be preserved undiminished, and, even then, we may not infer that this protective colouring has selective value, nor that, if it were absent, the species would necessarily have perished. At the same time Weismann points out that many of the cases of protective coloration which insects now exhibit, may not be at all necessary for their preservation at the present time, since, in some cases, a change in environment, in others, the extinction of an enemy against which they were protected, may have taken place. In these cases, "the protective coloration will continue until the law of organic inertia" (*i.e.*, the slow retrogression of superfluous characters) or new adaptations shall modify it.

It is suggested above that the control of nature in her minutest details is gainsaid us, and, even if this be so, yet Weismann considers that to renounce the principle of selection or to proclaim it as subsidiary on the ground that protective coloration is not really protective coloration, but a combination of colours inevitably resulting from internal causes, "is to sacrifice the gold to the dross," for the "protective colouring remains such," whether or not it be now useful to the species, and "arose as such." In Weismann's opinion, the colouring did not arise because "it was a constitutional necessity of the animal's organism, that here a red, and there a white, black, or yellow spot should be produced, but because it was advantageous, because it was necessary for the animal." He assumes that only selection offers an adequate explanation, and asserts that "we have no reason to assume teleological forces in the domain of natural phenomena."

Weismann then contrasts the position of those who argue that the spots and patterns of a butterfly's wing have been wholly determined by forces arising within the organism, and his own opinion that they have been determined by utility. He says:—"It has been frequently asserted that the colour patterns of a butterfly's wing have originated from internal causes, independently of selection and conformably to inward laws of evolution. Eimer has attempted to prove this assertion by establishing, in a division of the genus *Papilio*, the fact that the species there admit of arrangement in series according to design." Accepting this as a fact, Weismann asks whether "a proof that the markings are modified in definite directions during the course of the species' development, is equivalent to a definite statement as to the *causes* that have produced these gradual transformations?" He further asks whether "our present inability to determine with exactness the biological significance of these markings, and their modifications, is a proof that the same have no significance whatever?" Weismann then states his belief that the wing of a butterfly "is a tablet upon which nature has inscribed everything she has deemed advantageous to the preservation and welfare of her creatures; that the colour patterns have not proceeded from inward evolutionary forces, but are the result of selection. At least," he adds, "in all places where we do understand their biological significance, these patterns are constituted and distributed exactly as utility would desire."

It will be observed that up to this point Weismann offers no suggestion that the colours themselves are not produced by physiological processes. His point is, that their arrangement is not determined by internal forces working within the organism, but by selection guided by utility.

Notes on the early stages of some British Butterflies.

By JOHN J. WOLFE.

Melitaea aurinia.—The eggs of *M. aurinia* are always laid on the underside of a scabious leaf, near the ground. On one occasion I found the eggs laid on the leaf of a plant, known locally as "Snowberry," some three feet from the ground, and on this very young larvæ were feeding freely. Since then I have often reared the species on this plant. Eggs of *M. aurinia* are very difficult to find, as one cannot turn over a field full of scabious leaves, but I have often seen the remains of them, and twice I have persuaded females to deposit them in captivity. They are decidedly yellow in colour (Buckler says they are "pale brown"), and, I think, quite globular and shining. They are laid in a layer as closely as possible, and over the greater part of the first layer a second layer is deposited, and often a partial third. In one batch I counted considerably over 400 eggs, and I do not think this an unusual number. This February has been very mild, and the young larvæ of *M. aurinia* came out of their hybernacula in numbers, sunning themselves and nibbling at food on February 9th; and are now, March 4th, considerably grown, though they have not yet changed their skins, either indoors or out, since then, and are not preparing to do so. The pupa is almost invariably exposed. I have reared hundreds of them (of course, liberating the imagines in suitable places, as I have no sympathy with wholesale destruction), and have found dozens of pupæ in a natural state, and not half-a-dozen of all had a leaf drawn together in order to somewhat conceal them.

Pyrameis atalanta.—The newly-hatched larva of *P. atalanta* feeds at first on the upper side of the leaf, usually the young leaf on which the egg was laid, but if this has got a little hard it leaves it for one higher up. It retreats into the hollow just over the stem, and spins a flat roof of whitish web over its head, and under this it feeds. It probably lacks strength to bend the leaves to cover it.

When the full-fed larva of *P. atalanta* makes its tent of one large leaf with the edges drawn together, it cuts the mid-rib close to the base, so that the pupa hangs straight, or, as younger larvæ also do this, is it to keep off rain?

The remark made by Mr. Tutt (*Ent. Rec.*, vol. vii., p. 111) as to *Pyramiscardiui* endeavouring to pass the winter here without hibernating is, in certain years, evidently true of some *P. atalanta* also. In a fine autumn (*e.g.*, 1893), I have obtained very young larvæ up to the last day of October, but although all pupæ and larvæ out of doors were afterwards killed by the first severe frost, indoors I had imagines appearing in January, and (one at least) in February. This late one was crippled, but all those that emerged until the end of December came out in perfect condition.

Epinephela ianira and *E. tithonus*.—The pupa of *E. ianira* invariably

hangs. [Hellins states that "the tail ends in a short, stont, curved spike, on the top of which are a few straight, feeble bristles, quite unfit for suspending it; on the ventral surface, close to this spike, is a scutcheon of a somewhat rounded form, with a central cicatrice, and on the front edge two little projecting knobs, which, with the spikes, no doubt keep a hold on the cast larva skin. The colour is green, with some brown spots and lines. Boisduval has figured the pupa suspended by the naked anal spike, but I do not think that can be correct" (*Larvæ of Brit. Butts.*, p.167).] I reared fully thirty last summer, and a few before, and I do not remember that one of them dropped. I had also several (20) pupæ of *E. tithonus*, two or three of which did drop. The larva of *E. ianira* is occasionally brown in colour, but not so dark as the larva of *E. tithonus*.

Enodia hyperanthus.—I have three or four times found larvæ of *E. hyperanthus* in early summer, and once ('94-'95) reared a single specimen from the egg. All pupated in a cup-shaped hollow in the moss I provided, and I did not notice any cocoon. I thought them very hardy; I never lost one. They fed and showed themselves only at night, but did not seem to avoid lamplight. The one I had fed occasionally all through the winter, as did also some larvæ of *P. egeria* I had with it. Some of the latter died, the others pupated and emerged much earlier than those outside, but the *E. hyperanthus* appeared very little before its fellows [Compare this with *Ent. Rec.*, vol. vii., p. 258.—Ed.].

Thecla rubi.—I had one larva of *T. rubi* last summer, found and fed upon heath blossoms (*Erica tetralix*). It pupated in a chip-box; the pupa was attached to the side of the box, but the silken threads broke very easily when I wanted to remove it.

The Resting Habit of Insects as exhibited in the Phenomena of Hybernation and Aëstivation.

By W. F. DE VISMES KANE, M.A., F.E.S.

The interesting discussion started by Mr. Tutt on this subject has elicited a series of papers from others, and in Dr. Dixey's article we have had an admirable summary of the aspects of the general question. He has also supplied a welcome supplementary exposition of Mr. Tutt's position, which was not very clearly defined in the original paper (a failure very unusual with him), namely, that his contention was against the supposition that cold acted as the immediate stimulus in inducing individual hybernation, and not, as I took it, impugning the popular assumption that cold, directly or indirectly, originally induced what is usually called the habit of hybernation, with its various attendant phenomena. A portion of the paper which followed Mr. Tutt's, written by me, was, therefore, it seems, unnecessarily occupied with an attempt to show "a causal connection between cold and hybernation," that is, as I understood it, as an external factor which originated the racial habit. I would now wish to add a few remarks on the discussion which has ensued, especially as some of the points I relied on have been dealt with by Dr. Dixey in rather a summary manner. Although I am perhaps rash in questioning anything put forward by such an authority, I venture to doubt whether the present state of biological science warrants such large and far-reaching problems being disposed of so easily. Dr. Dixey takes exception to

my having referred to inherited habits, morphological adaptations, and acquired instincts as having acted as factors in the vital phenomena of various animals. Now, it seems to me that either he must take the position of denying that there are such things as those which go by the above titles, or else that these inherited tendencies produce results. As Dr. Dixey in his preceding sentence speaks of the "hybernating habit," and as Professor Weismann frequently employs the term "hereditary tendency," I presume that the existence of these phenomena is unquestioned. But if natural selection by a longer or shorter course of operations has given rise to a habit in any succession of individuals, that habit, though only a result, becomes a factor, so long as it survives, in controlling the actions of the organism; and, as I contended, in case of a change in the environment, before the new conditions have had time to induce a full reaction, the old habit would persist, and force the animal along the old groove, even to its detriment.

Now, if any results are produced by such instinct or habit, they may either be trivial and transient, or, on the other hand, they may be far-reaching and destructive of the race before adjustment to a changed environment takes place. Take the case, even hypothetically, of certain moths in the Arctic regions, which are said to be attracted by a bright light in the daytime, even as their fellows are in countries where night gives them a signal for flight. This instinct, if the fact is as I have mentioned, may be a survival from an earlier epoch, when those regions were not in their present position in regard to the pole, and were subject in part, at least, to alternations of day and night during the period of their imaginal existence. Or take any other hypothesis as to the origin of the instinct and its survival. One observer has recorded that he noticed numerous specimens drowned in the waters of a cascade, into the flashing sweep of which they persistently flew. Natural selection in the end eradicates prejudicial habits, if the animals survive during the period of that sometimes very slow process, but, pending this, the secondary factor will continue to operate. Dr. Ridg, whom I know to be an enthusiastic worker and careful observer, agrees that possibly my theory of unreasonable surviving habits may be a sufficient explanation of cases of hibernation which commence before any cold or scarcity of food has set in. He is mistaken in thinking that I deny the latter factor to be a possible predisposing cause in the evolution of a hibernating habit. My arguments were merely in support of the proposition that cold was an original and potent factor in its phyletic origin, but I nowhere negated the other suggestion. In pointing out that cold produced torpor, I merely desired to suggest that torpidity was a somewhat analogous phenomenon to hibernation, suggestive of homologous adaptations, probably both physiological and morphological in a similar direction. Dr. Dixey points out that the latter is physiologically different from the former.

I am unfortunately ignorant of the researches of Mr. Marshall Hall on this subject, and have no opportunity in the country to consult them; but torpidity would appear to be the direct effect of cold upon organisms not prepared to adjust themselves to the stress, while hibernation may be the acquired method of adaptation in such cases as are subject to regularly recurrent conditions of cold as obtain in

temperate or more Northern latitudes, and involving complex physiological changes. The habits of bears in tropical or sub-tropical regions would possibly be worth enquiring into, as to whether any tendency to resting habits analogous to hibernation exists. Recurring again to Dr. Dixey's criticism upon my position in regard to the inheritance of acquired characters, it really matters little whether the opinions of a mere student like myself have the sanction of Mr. Herbert Spencer's authority, or of those who follow the hypotheses advanced by Prof. Weismann and others, so long as the very abstruse subjects under their discussion remain undisposed of. Until the issue is decided, the dicta of neither can be gratuitously assumed as canons of biological faith. Meanwhile, students of morphology may talk of the apparent phenomena of acquired habits and instincts without discussing the metaphysics of their phyletic origin. And lastly, as to the real subject matter of Mr. Tutt's interesting article, namely, whether the "resting habit" of hibernation is referable to the periods of quiescence exhibited by the protozoa, I would wish to point out to Dr. Dixey that, so far from denying the capacity of protoplasm to allow such adaptations, I commenced by postulating that "all the phenomena of life are ultimately referable to the potentialities of protoplasm." This, however, is very different from stating positively, as Dr. Dixey does, that "the ultimate origin of the *habit*" (not merely the ability of acquiring it), "is no doubt to be sought for in the capacity for rest possessed by all protoplasm." Dr. Ridg very truly points out the difference between the habit of sleep, which is a physiological necessity, and that of hibernation; but, although the capacities of protoplasm permit of both one and the other, we do not seem by that admission to get a step nearer to the origin of the specialised hibernating habit in a relatively small number of the existing animals. The same capacity also allows of the endurance of long periods of functional cessation due to other causes, such as catalepsy, etc., without fatal results supervening; but to suggest that the habits of sleep, hibernation, aestivation, etc., were evolved by transmission from primitive forms of protozoa and metazoa, is a proposition which requires fuller knowledge of the phyletic evolution of existing forms than is at present available, to my mind. Dr. Dixey further on, however, takes lower ground, namely, that the "capability of protoplasm gives the requisite material for natural selection to work upon," etc., a thesis with which probably most people will agree.

The Genus *Dianthœcia*.

A discussion on the genus *Dianthœcia* took place at the meeting of the South London Entomological Society on March 12th last. It was opened by Mr. C. G. Barrett, who briefly touched on three points, which he considered to be of interest. These were:—(1) The probable specific identity of *Dianthœcia capsophila* and *D. carpophaga*. (2) His disbelief in the British authenticity of *D. compta*. (3) His belief that *D. barrettii* was a specialised form of *Luperina luteago*. His arguments were as follows:—

THE PROBABLE SPECIFIC IDENTITY OF *DIANTHŒCIA CAPSOPHILA* AND *D. CARPOPHAGA*.—A few years ago Mr. W. H. Blandford captured, on the coast of Pembrokeshire, a large number of the larvæ of a *Dianthœcia*, which produced imagines, that were, in Mr. Barrett's opinion, inter-

mediate in tint between typical *D. capsophila* and *D. carpophaga*. Mr. Elliott, of Roxburgh, N.B., also captured larvæ which produced similar intermediate specimens. The larvæ, too, Mr. Barrett averred were practically alike, and they had the same food plants.

With regard to this point, Mr. Tutt called attention to the following facts:—That in the Cooke cabinet, in the Liverpool Museum, were specimens almost identical with the intermediate specimens exhibited by Mr. Barrett. That taking into account the distribution of *D. capsophila*, it was remarkable, if it were only a form of *D. carpophaga*, that it should be so permanent in its characters from the Pyrenees to its most northerly range; further, that from undoubted larvæ of *capsophila* no specimens of *carpophaga* were ever bred; that it appeared to him that the doubtful specimens presented rather a condition of parallel colour variation than of specific unity; and also that, in a matter of doubt, it was infinitely better to retain two so abundantly distinct forms as separate species until their specific identity was proved beyond doubt, than to unite them on what is usually considered a very weak character—that of colour.

DISBELIEF IN THE AUTHENTICITY OF BRITISH *D. COMPTA*.—Mr. Barrett stated that the right of *D. compta* to be considered British rested on three facts: (1) The fact that it was a reputed British species. (2) The presence of two specimens in the Dublin Museum, said to have been captured by Mr. Tardy in Ireland. (3) The reputed capture of specimens by Mr. Meek at Howth. With regard to the species being among the “reputed” British species, Mr. Barrett pointed out that the *compta* of the old authors was undoubtedly our *conspersa*. As to Mr. Tardy’s specimens, he considered that there was no proof either for or against, except the fact that the specimens were in existence, and that other reputed captures by Mr. Tardy led him to think some mistake might have been made. He had no hesitation in refusing the Howth specimens a British origin, and he read a letter from the late Mr. H. Doubleday to himself, written at the time of the reputed captures, in which it was stated that “one of the so-called Howth specimens had been sent to him, that it was undoubtedly a re-set specimen, the pin being gummed, and that on being put into a damp box it returned very quickly to the original Continental setting.” He also added that the “food of *D. compta* did not grow wild at Howth, nor, in fact, in Ireland.” He also referred to the fact that Mr. Gregson, whom Mr. Meek stated to have likewise captured a *compta* at Howth, immediately denied the suggestion, and stated that the insect he did capture was a var. of *D. conspersa*, and that he did not believe that *D. compta* occurred at all at Howth.

Mr. South thought there was more evidence in favour of considering *D. compta* British than Mr. Barrett had adduced, for when visiting Canterbury on one occasion, some years ago, he called on Mr. Parry and obtained a specimen of *D. compta*, which Mr. Parry had taken with, and supposed to be an aberration of, *D. conspersa*. He now had the specimen in his collection.

Mr. Tutt agreed entirely with Mr. Barrett. So convinced was he of the want of evidence that *D. compta* had any claim to be considered British, that when he worked out this group some few years since he did not even include the species in his work on the Noctuides. He had also stated in that work that the *D. compta* of the old British authors was

nothing but *D. conspersa*. He also was able to add a little to the elucidation of the Canterbury specimens. By a curious coincidence it happened that on the very occasion that Mr. South exhibited the specimen of *D. compta*, that he had obtained from Parry, at the South Lond. Entomological Society's Meeting,* he (Mr. Tutt) had in his possession a box received from Parry containing five specimens of *D. conspersa*, and one of *D. compta*, with which he had received a note calling attention to the fine var. of *conspersa*, and asking what he (Mr. T.) would give for them. Mr. Tutt returned his specimen to Parry with a plainly expressed opinion, rendered all the more forcible by Mr. South's timely exhibit. He had no hesitation in coming to the conclusion that the Canterbury *D. compta* were not British.

DIANTHŒCIA BARRETTII AS A SPECIALISED FORM OF *D. (LUPERINA) LUTEAGO*.—Mr. Barrett said that, like other men, he was a little proud of his own discoveries. As he was the first to capture *D. barrettii*, he naturally was hard to convince that his species was really not distinct from the Continental *D. luteago*. Its colour was so different that he hoped in its distinctness, until Mr. Hellins bred it and proved the two species identical. He now agreed that *barrettii* was only a local race of *D. luteago*.

Mr. Tutt considered that it had long been conceded that *barrettii* was only a local race of *D. luteago*. He would like to have heard something of its affinities. Mr. Kane considered that it was in all essential characters a *Dianthoecia*, in spite of its larval habit. Mr. Tutt had come to the conclusion that *Dianthoecia* was in reality an Apameid genus, and he had in *British Moths*† recently transferred the tribe *Carpocapsidi* (containing the genus *Dianthoecia*) to the sub-family APAMEINE, where it fell between the tribes *Apameidi* and *Hadenidi*, so that the two genera—*Dianthoecia* and *Luperina*—were not, in his opinion, so far removed as their old positions in the British List would suggest.

There are only two reputed British specimens of this species which have been taken out of Ireland—one in Wales, the other in Devonshire (or Cornwall). Both these were exhibited by Mr. C. G. Barrett, and our attention was drawn to them by Mr. McArthur, who has caught a large number of the species at Howth. Mr. McArthur considers most positively that neither is *D. luteago* var. *barrettii*, and we agree with him. One specimen appears to be (so far as the bad light allowed one to judge at the meeting) a dark *Apamea basilinea*, the other a dark *Dianthoecia conspersa*. We throw out doubt in this brutal fashion in order to obtain from Mr. Barrett an explanation of the structural characters on which he named these two specimens *D. luteago* var. *barrettii*.

BREEDING DIANTHŒCIA CARPOPHAGA.—Mr. T. Hall, in the course of the discussion, referred to the ease with which *D. carpophaga* could be bred. A few years since, when walking one evening in the neighbourhood of Croydon, he observed large numbers of the larvæ of this species feeding. He collected the seed-heads on which the larvæ were feeding, and placed them (with the larvæ) in a large bandbox, containing at the bottom an inch or two of sand. He took no more

* This exhibit and the discussion that followed, appear never to have been published in the *Proceedings* of the Society.

† Routledge & Sons, Ltd.

trouble with them, and they emerged next year in large numbers. The essential point, in his opinion, was to leave them alone and to disturb them as little as possible. The colour-variation extended from almost white to dark ochreous. The food-plant of the larvæ that he captured was *Lychnis respertina*.

RESEMBLANCE OF *D. CONSPERSA* TO THE COLOUR OF THE ROCKS ON WHICH IT RESTS.—Mr. McArthur stated that *D. conspersa* rested on rocks, and that its colour to a very great extent responded to the colour of the rocks on which it rested. He observed that, when collecting in the Shetland Isles, the specimens that were captured on Mainland were very dark in colour, approximating closely to the tint of the dark rocks on which the moths rested. In Unst, on the north-west coast, an intermediate form was taken, the rocks there being less dark, whilst he had observed when collecting in the Outer Hebrides, where the rocks were largely mottled with a yellow lichen, that the moths were much mottled with a yellow tint. In the Southern counties of England its natural habit was to rest on the chalk, and in these localities the beautiful, although common, black and white form was the only one obtainable. He observed, too, that whilst *Silene inflata* was the food-plant of the larva of this species in the South of England, in Unst it fed on *Silene maritima*.

DIANTHECIA CONSPERSA VERSUS *D. NANA*.—It was amusing during the discussion on this species to hear Mr. Barrett continually refer to this species by the former name, whilst Mr. South referred to it by the latter. Mr. Tutt pointed out that he had already shown that Hufnagel's *nana* referred to *Hadena dentina*, and not to *Dianthecia conspersa*, and that it was, therefore, an error to continue to use the name *nana* for *D. conspersa*.

Notes on *Eupithecia stevensata*.

By SYDNEY WEBB.

Very little is yet known of *Eupithecia stevensata*. It has never been bred, the nearest approach to it being the finding of a female with limp wings sitting on a stem of a golden-rod plant. It was not a bad find, for I netted more than thirty visitors to her that evening. This species is mentioned in Stainton's *Manual* as "*sobrinata*, Dover?" I cannot see the likeness to this species, however, and its time of appearance—the latter part of September and October—is against it. I have searched in vain for a first brood which this date seems to suggest.

E. sobrinata flies in sunshine, at 5 p.m. or thereabouts, in July as a rule, and around its food-plant. *E. stevensata* flies close to the short turf of the downs. It visits flowers, but is wary. If a net be placed over it and the flower, it does not rise, but, on the contrary, drops, and then starts out underneath.

The very few eggs that have been obtained have mostly proved infertile, but they certainly do resemble the green brick-shaped eggs laid by *E. sobrinata*. Up to the present, the moth will not lay on juniper, and the young larvæ have refused to eat it.

The only known locality is Dover. It has, however, been erroneously reported from the Isle of Wight, Bond's specimens from there being distinctly different from the Dover insects.

VARIATION.

ON THE DISTRIBUTION OF THE VARIOUS FORMS OF *OPORABIA DILUTATA*.—The following Table on the various forms of this species may prove useful to those who are at work on the distribution of local forms :—

Locality & Authority.	No. Examd.	Pale greyish with indistinct lines.	Pale grey with distinct transverse lines.	Dark grey with indistinct transverse lines.	Dark grey with distinct transverse lines.	Unicolorous dark grey.	Unicolorous greenish-grey.
Suffolk (Mr. Norgate)	7	2	2	1	1	1	0
Yorks (Mr. Norgate)	8	0	3	3	2	0	0
Shirley (Mr. Turner)	43	0	1	20	10	8	4
York (Mr. Walker)	?	0	Many, common	12	2	Many, common	6

I should be glad of lists from all parts of the country.—J. W. TUTT.

The pale form of *O. dilutata* used to be largely in excess of the other forms at Redhill some 20 years ago. Here the insect is not common, and its place seems to be taken by the more silky triangular-winged *autumnaria*.—SYDNEY WEBB, Dover. March, 1896.

VARIATION OF *XANTHIA FULVAGO*.—I was much interested to note, though only a “beginner,” the account of the variation occurring in *Xanthia fulvago*, Linn. Perhaps the following notes on the same subject may prove of interest. In going through my series of 23 specimens, all captured at Wylam-on-Tyne, I find the following forms :—(1) Light ground colour with central spot dark = *flavescens*, Esp. Of this form, which is usually fairly plentiful, I have seven specimens. It is, however, more abundant in some years than in others. Some have the faintest possible traces of the usual bands. (2) Light, with distinct red markings = *fulvago*, Linn. I have only five of this form, but it is usually fairly well represented among both captured and bred specimens. (3) Pale, with dark purplish markings = ab. *suffusa* (*cerago*, Newm.). The majority of specimens I meet with are of this form, which may be taken as the commonest in this district. (4) Orange-yellow with red markings = ab. *aurantia*, Tutt. Two specimens only. Besides the above, I have one bred specimen, far below the average size, in which the bands show a tendency to suffusion over the median area of the wings. I have a second specimen, also bred, scarcely one inch in alar expansion.—C. H. CRASS, 12, Eastbourne Grove, South Shields.

In 1894 I bred my present series of *X. fulvago*, which consists of 34 specimens. All are of the pale yellow coloration, and are distributed among the various forms as follows :—

- (1) Pale yellow with purple band and markings—10 specimens.
- (2) Pale yellow with red markings—7 specimens.
- (3) Pale yellow with faint markings—13 specimens.
- (4) Pale yellow with central spot only—4 specimens.

In 1890 I collected a large quantity of sawfly catkins, and from these

without any further feeding or attention, I bred 82 moths. Of these, 10 inclined to the purple-banded form, but were not so strongly marked; 19 were pale with dull markings, 32 pale with very faint markings (approaching var. *flavescens*), 21 were of the latter aberration. The ground colour was pale yellow, and there were none with reddish marks among them.—A. E. CANNON, Mannofield, near Aberdeen. *March*, 1896.

The differences exhibited by the specimens of *X. fulvago*, in my series, run into one another gradually, and it is impossible to draw hard and fast lines. The purple band runs into a reddish-ochreous one with faint purple tinge only; the well-marked band into the faintly marked, and the faintly marked into var. *flavescens*, and even in these the outlines of stigmata, transverse lines and dots can be traced. By the way, does ab. *flavescens* breed true? Most of my specimens have a primrose-yellow ground colour; I have none with orange yellow, but three are of a somewhat dusky deeper yellow (not primrose at all) a yellow with a tinge of brown in it. These are from Buckerell. I have only bred three ab. *flavescens* from catkins collected here during 4 years—4 in my series are from Wimbeldon. Has it been noticed that these are bred from one sort of sallow more than from another? I seem to remember having heard this suggested. The long-leaved sallows (*Salix caprea* and *S. cinerea*) are the commonest here, the round-leaved (*S. aurita* ?) rarer.—W. S. RIDING, M.D., F.E.S., Buckerell Lodge, near Honiton. *March*, 1896.

I have taken very few specimens in this neighbourhood. The only three from near Weymouth in my series are rather pale yellow with chocolate-coloured markings.—N. M. RICHARDSON, B.A., F.E.S., Monte Video, near Weymouth. *March*, 1896.

Of a large number of *X. fulvago* which I saw on the sugar last autumn in Suffolk, I took only 3 of the pale-lemon form=ab. *flavescens* and one of the parallel orange-yellow form=ab. *aurantia*, whilst here at Rainham I took only 2 of the ab. *flavescens*.—(Rev.) C. R. N. BURROWS, Rainham, Essex. *March*, 1896.

CURRENT NOTES.

There appears to be little doubt that such hybernation as *Colias hyale* is capable of, takes place in the larval stage. Mr. H. Williams records that of three larvæ which attempted to hibernate (indoors), and which had, on December 10th, 1892, been quiescent thirty days—one died at the end of December, one on February 22nd, 1893; the third commenced feeding on March 17th, 1893, and continued to do so until April 8th, when it attempted to moult, but died on April 13th without doing so.

Mr. Mitchell records *Papilio machaon* (12 examples) and *Euchloë cardamines* (3 examples) passing two winters in the pupal state. The same gentleman adds that at Starcross, *Callimorpha hera* was “more easily obtained in bright sunshine, one specimen, not apparently disturbed,” being captured as it was “flying over clover blossoms quite naturally, like a butterfly.”

The Rev. O. Pickard Cambridge records the capture of 102 specimens of *Tinea nigripunctella* on one window of his house (Blox-

worth Rectory), during four weeks in July and August last. *Acipitilia paludum* was scarce, one specimen, however, as early as June 4th.

Mr. Grover records "one specimen of *Agrotis obelisca*, taken July 20th, 1895, at flowers of *Epilobium angustifolium*, in the Guildford district. This is a very unexpected locality.

The two cockroaches, *Periplaneta australasiæ* and *P. americana*, have both been captured in England. The former has more distinct markings, with a deep black patch on the thorax, and a broad yellow streak along the basal portion of the costal margin of the fore-wings; the hind-wings are also comparatively broader, and the mouth appendages shorter than those of *P. americana*. The specimen recorded as *P. americana*, captured in Kew Gardens on April 23rd, 1895, was in reality *P. australasiæ*.

Mr. C. A. Briggs writes that 7 British specimens of *Aplasta monaria* are known. One (captured 1866 by Mr. Piffard) is in the "Doubleday collection." Three specimens (captured by Mr. F. Standish) are in Mr. Webb's collection. Two specimens (captured by Mr. Holyday) are still in the captor's possession. One specimen (captured by Mr. Purdey), is in Mr. Briggs' collection. All other reputed British specimens want inquiring into.

Mr. F. C. Lemann has done an excellent piece of work, *The Butterflies of Switzerland*. It is a translation of that portion of Professor Dr. Heinrich Frey's *Die Lepidopteren der Schweiz*, relating to the Rhopalocera. It is a marvellously good translation, and the work is remarkably well printed and arranged. It is, unfortunately, only printed for private circulation.

Dr. Chapman finds that the pupa-cases of the supposed true *Solenobia triquetrella* (from Mr. Sidebotham's collection) are not distinguishable from those of *S. inconspicua*, the apterous ♀ moths of which also agree absolutely in the number of the joints of the antennæ and tarsi. He points out, however, that these may be generic and not specific characters, and hence these supposed separate species may be one or distinct species.

Mr. Blatch adds *Quedius riparius*, Kellner, to the British list, from 14 specimens captured at Porlock in February. It belongs to the *Sauridus* group, and lives on the margins of the streams flowing from the hill-country in the neighbourhood of Porlock.

Mr. Bradley adds *Pogonota hircus*, Zett., to the Diptera of Britain. He captured about 30 specimens by sweeping rushes at Blackroot Pool, Sutton Park, in June, 1895. The male is peculiar in having a "long, thick wisp of hair proceeding from the genitalia and curling up on each side of the abdomen, giving it a most curious appearance. A similar wisp of hair is present beneath each cheek." He also records the following rare species:—*Dicranomyia stigmatica* (Wyre Forest, August, 1894). *D. ornata* (Wyre Forest, June, 1894), *Erioptera pentagonalis* (Cannock Chase, June, 1895).

Many entomologists are interested in photography. One of the most difficult matters in connection with photographing insects has been to get rid of the exceedingly heavy shadows which are often thrown by the insects. This appears to be obviated by placing the insects on a sheet of ground glass, with a sheet of white paper at some little distance from and behind the glass. The insect may be fastened by attaching (with glue) tiny pieces of cork to the glass, and inserting the pin therein.

Professor Garman writes of the oviposition of the Bot-fly (*Gastrophilus equi*):—"This fly buzzes about horses during the hot summer days, occasionally alighting on their bodies, and, when an opportunity offers, placing its eggs among the hairs on the inside of the knee, on the shoulders, and sometimes even on the mane. Its mouthparts are in a rudimentary condition, and it cannot, even if it were so disposed, do any injury to horses. It is probable that the grubs recently hatched from the eggs of this fly are taken into the mouths of horses on the lips or tongue. I am told by a gentleman who has had much experience with horses, that he has, on many occasions, taken the eggs between the moistened palms of his hands, and in a few moments felt the young grubs wriggling about. It appears that moisture accelerates the hatching of the eggs, and it is just possible that many eggs would never hatch at all if the eggshell was not moistened in some way. Whether this must be from the horse's tongue or lips, in all cases, is a question which may be considered not yet settled. Professor H. Osborn is disposed to believe that the young do not hatch unless moistened by the horse's tongue, and that the young grubs generally die in the eggs if left for 35 to 40 days."

Herr J. Röber, of Dresden (*Ent. Nachr.*, xxii., No. 6), describes the following new varieties of British Lepidoptera from the Cilician Taurus.—*Pieris brassicae* var. *catalaunica*. Larger than the type, the black apex much less sprinkled with white atoms, in the ♀s the black projections inward therefrom longer and sharper, and the black spot on the inner margin of the fore-wing only indicated by dark scales; the black spot on the costa of hind-wing large and sharp.—*Argynnis lathonia* var. *saturata*. The red-brown markings of the underside of hind-wing darkened, the silver spots particularly well expressed; ground colour of upperside lighter than the type.—*Argynnis aglaia* var. *ottomana*. Larger than the type, the upperside strong red-brown, the black spots larger and more confluent, the silver spots on the underside of the hind-wings less developed, of the fore-wings entirely wanting, etc., etc.—*Dryas (Argynnis) paphia* var. *delila*. The ♂s somewhat redder than German specimens, the ♀s with upperside greenish, almost as in ♀s of *D. pandora*; underside lacking, in both sexes, the violet colouring on the silver bands of the hind-wings.

The collection of the Rev. C. A. Sladen was sold by Messrs. Stevens on April 13th. The chief prices were as follows:—*Pieris daplidice*, 17/-; *Euranessa antiopa* (2), 18/-; *Argynnis lathonia*, 22/-; *Chrysophanus dispar*, 26/-, 30/-, 10/-, 75/-, 47/6, 42/-, 24/- per specimen; *Polygonmatus corydon* vars., 25/-; *Deilephila liornica*, 20/-; *Choerocampa celerio*, 11/-; hybrid *Smerinthus ocellatus-populi*, 22/-; *Deiopeia pulchella*, 12/-; *Laelia coenosa*, 10/-, 8/-, 14/-, 14/-, 8/-, per pair; *Drepana harpagula*, 21/-, per pair; *Lasiocampa ilicifolia*, 32/6, per pair; *Bryophila impar*, 13/- (for 4); *Agrotis subrosea*, £4 (for 4); *Pachnobia hyperborea* var. *alpina*, 40/- (for 6); *Crymolex erulis*, 35/- (for 4), 32/6 (for 4); *C. erulis* var. *assimilis*, 35/- (for 5), 40/- (for 5); *Cleora viduaria*, 20/-, 21/-, 12/- (per pair); *Strenia clathrata* (nearly black var.), 30/-; *Phibalapteryx polygrammata*, 6/- (for three), 10/- (for 3), 6/- (for 4); *Eustroma reticulata*, 14/- (for 3), 10/- (for 2); *Callimorpha dominula* ab. *lutescens*, 28/-.

The French work on Coleoptera reviewed in our last number can be obtained from Bailliére, Tindal and Cox, 20, King William Street, Strand.

With this number we are sending, free to each subscriber, a copy of a new "Label List of British Butterflies." It will enable those who wish to rearrange their collections, so as to exhibit the latest pronouncement on the subject, to do so.

NOTES ON COLLECTING, Etc.

SPRING NOTES.—Insects have been abundant at the willows, and before the willows were in flower I took *Taeniocampa munda*, *T. pulverulenta*, *T. stabilis*, *T. instabilis*, *T. gothica*, and a few *Xylina socia* and *X. rhizolitha* at sugar, but no *Dasyampa rubiginosa*. *Orrhodia vaccinii*, *O. ligula* and *Scopelosoma satellitia* were there in numbers. I never saw so many specimens of the last named before; there were from ten to a dozen on every patch of sugar. *Tephrosia crepuscularia* has been very abundant during March. I invariably find it drying its wings at the base of larch trees.—J. MASON, Clevedon Court Lodge, Somerset.

On April 4th the willows at Dinmore (Hereford), were nearly over, but *Pachnobia rubricosa* ab. *rufa*, *P. leucographa* and ab. *lepetitii*, *Taeniocampa miniosa*, *T. instabilis*, *T. stabilis*, *T. gracilis*, *T. pulverulenta*, *T. populeti* (one lovely ab. *nigra*), *T. munda* and ab. *immaculata*, *T. gothica* (some with the \sqcap -like mark very constricted), *Hoplorina croceago*, *Gionoptera libatrix*, *Panolis piniperda*, and quite a number of *Eupithecia abbreviata* (just out) were taken. On April 9th we saw quite a number of cocoons of *Cerura bicuspis* on alder, and *C. bifida* on poplar, but all empty. *Polygonia c-album* was on the wing. On April 10th a male *Euchloë cardamines* deserves mention. *Pieris rapae* was seen several times during the week.—J. W. TUTT. April, 1896.

THE HABITS OF *ACIDALIA EMARGINATA*.—Almost all collectors take this species occasionally; it is very rarely that any large number, however, can be obtained. It is frequently to be taken just at dusk flying among willow bushes (although willow is not mentioned as a food-plant for the larva). I have taken odd specimens at sugar, and beaten occasional specimens by day. Mr. Bayne says that it is fairly common in the bogs of the New Forest at dusk, and that he saw it very commonly in a road, leading through damp fields, near Aylesbury, in July, 1893, and believes that it is reported as occurring very late in the evening. Mr. J. Mason states that the few specimens which he has taken have been netted at dusk. Mr. Sydney Webb says that the species is very local, but generally pretty abundant where it occurs, and that, although it may be beaten by day, like *A. imitaria*, it flies by preference somewhat late in the evening. It appears to be one of those species which can only be obtained in any numbers when the males are assembling, and that, to get a good series, one should search with a lantern on the herbage where the males are flying, for a female. No doubt it is easy to breed, like most of its congeners.—J. W. TUTT. April, 1896.

RARE BRITISH LEPIDOPTERA.—In my previous note (*Ent. Rev.*, vol. vii., p. 317), I drew attention to *Synia musculosa*, and asked for information. Three more were sold in the Rev. C. A. Sladen's collection. These were labelled as follows:—"Wye Downs, 1885, Morley collection"; "Brighton, 1878, Stowell collection"; "Bristow, Bexhill,

Harper collection," and sold for 6/-, 4/-, 4/- each respectively. Lot 115—" *Xylina zuckenii*, Deal, 1886. A. Austin," fetched 5/-; there was also " *T. ostrina*, Freshwater, Rogers," which, with 73 other insects, went for 5/-; *Boletobia fuliginaria*, "Blackheath, Stevens," went for 5/-; 3 *Sterrhia saccharia* and 2 *Lythria purpuraria*, "Essex, Button," went with 81 other insects for 6/-. Is there really no entomologist in the country who can give me information as to *Synia musculosa* and *Lythria purpuraria* as British species?—JONX BULL, London. April, 1896.

EARLY SALLOWING.—On March 21st Mr. Duncan and myself paid a visit to our favourite early sawlow, and to our astonishment found it in full bloom. Having returned home for our sheets, we arrived at it again at half-past seven in the evening, and made three separate shakes, capturing six *Taeniorampa gothica*, three *T. stabilis* and three *T. incerta*, together with a fair number of worn *Scopelosoma satellitia*, *Calocampa croleta* and *Orrhodia raccinii*. From the appearance of the sawlows in the woods they will not be out for at least another fortnight, but this is out in the open, and is always a fortnight before the rest. This is the earliest record I have ever made for the appearance of *T. gothica* and *T. stabilis*. In reading Mr. Tutt's article of March 1st on "Sallowing," it struck me at the time that Dr. Chapman would be unable to carry out his method of working sawlows in this district, because all our sawlow trees are trees, and not mere shrubs. One tree in particular we are in the habit of working is at least thirty feet high, with a trunk of six feet in circumference, and even the lower branches are ten or twelve feet above our heads. The only way we can work this is by taking one limb of the tree at a time, and Mr. Duncan climbs (I am not a climber) as far as he possibly can to the end of the branch, and there goes through various antics in his endeavours to shake it, which remind one of the habits of some of the large anthropoid apes, for his mutterings and chattering, as a rule, are entirely unintelligible, except perhaps when one of his eyes gets half impaled on a projecting twig, and then one could almost fancy oneself on a dark morning in Billingsgate market. While all these manœuvres are going on up in the tree, hosts of catkins, earwigs, queen wasps and moths come hailing down upon the sheets and myself, and then my curiosity to look into the sheets has still to wait, as I must show a light to enable Mr. Duncan to find his way down the trunk. We then both start together and search the sheets, going on the principle of "findings, keepings." The only ideal way of working this particular tree would be to spread underneath it the mainsail of a man-of-war, and have ropes attached to the top, with a team of men, who have been well trained in the game of "tug of war," to manipulate the ropes. I feel sure that if this could only be done we could supply all the collectors in Britain with a full series of all their wants.—MONTAGUE GUNNING, M.D., Montrose. April 22nd, 1896.

SCIENTIFIC NOTES AND OBSERVATIONS.

NOTE ON THE USE OF XANTHIA.—In recent papers I have noted the fact that Ochsenheimer identifies Hübner's *fulvago* with *paleacea*, hence the true type of *Xanthia* becomes the latter species. I had hoped to

avoid what is a distressing change, by assuming that the *fulvago* of the *Tentamen* was *fulvago*, L. (= *cerago*, F.); but Mr. L. B. Prout writes me that this assumption cannot be accepted in the face of the fact that the Linnean name of *fulvago* for *cerago* was not at all employed in Germany till comparatively quite recently. For the *paleacea* of Esper, the *fulvago* of Schiffermüller, we must use *Xanthia*, Hübn., *Tentamen*, 1806. Thus *Euargia*, Hübn., *Verzeichniss*, 235, falls before *Xanthia*. Hübner himself identifies Schiffermüller's *fulvago* with *paleacea* in the *Verzeichniss*, and there seems no possible doubt that the *Tentamen* names are used in the sense in which they were employed by Schiffermüller. In the *Verzeichniss*, 234, we first have the term *Cirrhia* for *citrago*, L., and *fulvago*, Linn. (= *sulphurago*, Schiff. = *ochrago*, Esper). This latter identification is now considered erroneous, and the insect is *sulphurago*, Fab., a species I have not been able to examine. Mr. J. W. Tutt kindly writes me that he has separated *citrago* generically from the old genus "*Xanthia*" under the name *Tiliacea*. If *Cirrhia* has been previously used by any author since Hübner, for *citrago* alone, then *citrago* becomes thereby the type of *Cirrhia*. Or if, again, *sulphurago* is not generically distinct, or belongs to some previously named genus, leaving *citrago* for *Cirrhia*, then *Tiliacea* would fall. If *sulphurago* is a "*Xanthia*," which, from what I can learn, I doubt, then it might become the type of the genus for which *Cirrhia* would be retained. At present we have *Tiliacea citrago* and *Cirrhia sulphurago*, an unknown quantity. In ascertaining the type of a genus, a knowledge of the literature and a knowledge of structure must go hand in hand and work together. Either failing, the facit is unreliable. After *Cirrhia* we come to *Citria*, *Verzeichniss*, 234,—*cerago*, Schiff., and *silago*, Hübn. = *flavago*, Fabr. = *togata*, Esp. This seems, then, the earliest term for what we have been calling "*Xanthia*." I would propose, then, to call the genus, *Citria*, with *flavago*, Fabr., as type, a species found in North America as well, the choice being open. We then come to *Mellinia*, *Verz.*, 235, for *paleacea* = *gilvago* var. and *ocellaris*, Borkh. If these two (or perhaps only one) species are generically identical with *Citria flavago*, the term will, of course, fall.—A. R. GROTE, M.A., Hildesheim. April, 1896.

Tabulated, these results of Professor Grote give the following changes in the British List:—

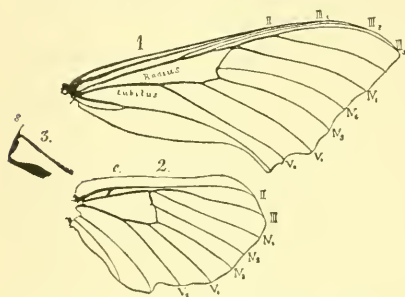
<i>Citria</i> , Hb.	<i>Mellinia</i> , Hb.
flavago, Fab.	gilvago, Esp.
fulvago, Linn.	ocellaris, Bkh.
<i>Tiliacea</i> , Tutt.	circellaris, Hufn.
citrago, Linn.	<i>Xanthia</i> , Hb.
? aurago, Fab.	paleacea, Esp.

We have no hesitation in asserting that the insects at present included in the genus *Xanthia* belong to at least three distinct genera. Whether *aurago* belongs with *citrago* or not there is at present insufficient evidence to decide, but the little that is known would suggest that its affinities are rather with *Tiliacea* than with the other genera.—J. W. TUTT.

DISTRIBUTION OF *TORTRIX VIBURNIANA*.—My friend, Mr. J. E. Robson, is in error in stating (*ante*, p. 266) that *Tortrix viburniana* is "only found on Northern moors," for it is very abundant on the extensive tracts of moorland in this part of the South Coast: the larvæ are plentiful on *Myrica gale*, as well as other plants, and in 1894 I found

them commonly on *Lotus major*. Perhaps Mr. Robson has been misled by Stainton's remark in *Man.*, ii., 198, that *riburniana* is "common on moors in the North of England and Scotland," but Stainton cannot have meant to imply that it did not occur in the South, for he derived all his information about the Tortrices from S. J. Wilkinson's work, and Wilkinson says (*Brit. Tort.*, p. 44) "occurs throughout the country, but more commonly in the North of England; also in Scotland, and at Killarney, in Ireland."—EUSTACE R. BANKES, M.A., F.E.S., The Rectory, Corfe Castle, Dorset. March 28th, 1896.

STRUCTURE OF COPISMERINTHUS. — In illustration of my note on



the British species of *Smerinthus* (*Ent. Record*, vii., 56), I offer the above drawing of *Copismerinthus ocellatus*, Linn. sp.^o. The figures are of natural size. The veins numbered are in accord with the amended system Redtenbacher—Comstock (*Venation of the wings of Insects*, 1895, 83). Fig. 1, Primary wing of *Copismerinthus ocellatus*; Fig. 2, secondary ditto, *c.*, cross vein: Fig. 3, fore-leg, with tibial spine (♂).

—A. RADCLIFFE GROTE, M.A., Roemer Mus., Hildesheim.

* Consult also Grt., *Journ. N. Y. Ent. Soc.*, iii., 132.

PRACTICAL HINTS.

RE-PAPERING CABINET DRAWERS.—I never re-colour cabinet drawers, but always re-paper them when necessary. To do this, first paper the bottom of the drawer (the paper should be cut about half-an-inch each way in excess of measurement), affix with starch paste, and afterwards add the top and bottom strips, each to come round the corners about half-an-inch; the side strips should be cut into lengths exactly of the measurement required, and must be put on last. All these strips are added after the bottom is dry, and they should be higher than the sides of the drawer, the superfluous height to be trimmed off afterwards (when stiffly hardened) with a sharp knife edge. Various papers have been suggested, but I find the best and cheapest to be what paper-hangers call lining paper—ninepence a roll of about twelve yards. This is far better than cartridge or other fabrics, has but few blemishes, and is sufficiently porous to take the damp readily.—S. WEBB, Maidstone House, Dover. April, 1896.

I prefer re-papering cabinet drawers to painting them, and always use the wall-lining paper recommended by Mr. Webb, which is soft, and does not turn up the points of the pins. I remove the old paper by thoroughly wetting two or three folds of calico in hot water and laying them in the drawer. These moisten the old paste in a short time, when the paper is easily stripped off. I always dissolve a lump of carbolic acid in the paste before using—J. MASON, Clevedon Court Lodge, Somerset. April, 1896.

PAINTING CABINET DRAWERS.—With regard to Mr. Studd's query (*Ent. Rec.*, vii., p. 277), the best paint for doing cabinet drawers is, I

think, that given in *The Insect Hunter's Companion*, p. 81. It is made as follows:—"Dissolve about a drachm of isinglass in half a pint of boiling water. Let the solution stand until cold; then remove the clear jelly. Warm this and mix it with the best zinc white (oxide of zinc) and an additional half-pint of water, until you have a paint of the consistence of good cream; stir in, until perfectly mixed, an almost imperceptible amount of ultramarine blue, and an addition of two grains of powdered white arsenic. This paint is whiter than paper, besides, it prevents the diffusion of grease." I used to keep my insects in store-boxes painted with this, and found it very satisfactory.—(Major) R. B. ROBERTSON, Wellington Court, Cheltenham. April, 1896.

I paint my drawers instead of, and to avoid the, to me, difficulties of re-papering. The *modus operandi* is simple in the extreme. I buy small bottles of "Chinese White," from Reeves and Son, colourmen. Cheapside, mix with plain water, in a saucer, to the consistency of thin cream, give two or three rubs with a stick of Indian ink, to take off the dead whiteness, and then paint the drawers (having first cleaned them) with a large flat water brush, such as is used in offices to damp press copy letter-books; take up any surplus liquid with a piece of blotting-paper, and then dry the drawers carefully by the fire. The use of gum gives a glazed appearance, which I deem unsatisfactory and therefore avoid.—T. W. HALL, F.E.S., Stanhope, The Crescent, Croydon. April, 1896.

The object of my previous note (*Ent. Rev.*, vii., p. 277) is to get a paint which can be used over paper. My object is twofold: (1) To get a surface on which pencil lines can be ruled and easily got rid of when required; the paint I have been using does this admirably. (2) To discourage mites and mould without injury to the insects. It is here that I fear my paint, for some reason, fails. Though I have no mould and can find no traces of mites, my insects (which do not touch the bottom of the drawer) are apt to get fringed, and to have a worn appearance. Of course, not all, or even most, but still an appreciable percentage, *Tryphaena fimbria* being an especial victim. The drawers are kept well supplied with naphthaline. Is it safe to dip insects in corrosive sublimate dissolved in alcohol, as recommended by Mr. Chope (*Entom.*, xxviii., p. 338)? and what would be its effect on the fringes of the insects thus dipped?—E. F. STUDD, M.A., B.C.L., F.E.S., Oxtou, Exeter. April 13th, 1896.

There is no doubt that the advice given by Mr. Chope (*Entom.*, xxviii., p. 338), and referred to by Mr. Studd, is about as bad as can be offered. I remember well, as a youngster, dipping insects in corrosive sublimate dissolved in alcohol, with a most marvellous and unlooked for result, the specimens becoming covered, as Mr. Richardson points out,* with a white coating, which entirely spoils them. The use of corrosive sublimate should be always carried out with great care, and the weakness of the solution should be, as Mr. Richardson further explains, such that no possible deposit can be detected after the evaporation of the fluid. The off-hand advice of one beginner to another (or to older hands, who think that the said beginner is an authority on such matters), often results in working considerable injury to the specimens of those who profit by such crude and undigested information.—J. W. TUTT.

* Mr. Richardson's note has unfortunately been crowded out of this issue.—ED.

Field work for April and May.

By J. W. TUTT, F.E.S.

1.—During April the larvæ of *Cirrhoedia xerampelina* are to be found under moss on ash trunks, or among the ash-blossoms. They are more readily obtained by night, feeding on the blossoms.

2.—During April, *Apamea unanimes* pupates under loose bark of willow trees, or in stems of thistles.

3.—In early April collect the dead teasle heads of the previous year. Keep in a bandbox, and you will breed *Penthina gentiana* and *Eupocilia roseana*.

4.—During April, the small bushes in a recently cut wood should be searched by night for larvæ of *Aplecta tineta*, *Tryphaena jimbria*, etc.

5.—Search the trunks of apple trees during April for *Eupithecia consignata*.

6.—During April, the small larvæ of *Pericallia syringaria* are to be found hanging at night from their food-plant (honeysuckle).

7.—In the months of April and May the larvæ of *Retinia buoliana* are plentiful in the leaf buds of different species of *Pinus*. The presence of a larva can be assumed by there being an opaque and hollow resinous exudation on a bud.

8.—When apple trees (crab or cultivated) are in blossom, collect the blossoms that are spun together by a silken web. The larva of *Eupithecia rectangularata* feeds within.

9.—The larva of *Tethia subtusa* is to be found on poplar, between two leaves spun together. It is full-fed towards the end of May.

10.—In early May the terminal shoots of juniper bushes should be searched for the feeding larvæ of *Argyresthia dilectella*.

11.—Those who wish to pair *Spilosoma mendica* must, as is the case with many other species, put them in a cage through which a current of air blows.

12.—In May the full-fed larvæ of *Lencania littoralis* are to be found feeding by night on *Ammophila arundinacea*, and hiding by day at the roots of the same plant.

13.—During May the larva of *Taeniocampa gracilis* may often be found in marshy places, in tents formed of leaves of *Spiraea ulmaria* spun together.

14.—The larva of *Clisiocampa castrensis* will feed freely in gardens on common garden chrysanthemums.

15.—During the first week in May the young larvæ of *Scotosia retulata* mine the young shoots of *Rhamnus catharticus*, their presence being indicated by the drooping condition of the young twigs. After a week or so they emerge from the mine, and live in a shelter made by spinning two or three young leaves together.

16.—Beating juniper in May gives larvæ of *Eupithecia sobrinata*.

17.—During the first fortnight of May the larva of *Oryptilus heterodactylus (teucriti)* is to be found full-fed on the leaves of *Teucrium scorodonia*. The larva eats a small round hole into the stem about two joints down, which causes the tip of the plant to droop, and then eats the growing leaves around.

18.—In early May the larvæ of *Sesia philanthiformis* are to be found feeding in the stems of sea-thrift (*Statice armeria*), which grows in profusion in many coast districts. The stunted plants scattered in the

clefts of waterworn rocks are those selected. A little red patch on the cushion of thrift betrays the work of the larva, and after a little practice affected plants may soon be recognised at a distance.

19.—During May the larvæ of *Depressaria cnicella* are to be found on *Eryngium*; their presence may usually be detected by the dirty brown appearance of the leaves, which they roll up.

20.—In May the larvæ of *Dyschorista upsilon* can be obtained in abundance beneath the loose bark of willow trees, where they hide by day. They go up at night to feed. The larva of *Catocala nupta* may often be found in the same places.

21.—The birch trees on the Muckcross peninsula at Killarney are reported to be the exact haunts of *Notodonta bicolor* in Ireland. The imago appears in May, the larva in June.

22.—In April, look over the willow sticks that have been cut in woods (or elsewhere) during the previous winter. In them a number of orifices will often be observed. The burrows contain the full-fed larvæ of *Trochilium bembeciforme*.

23.—At the end of April and beginning of May the larva of *Nephopteryx abietella* sometimes feeds in a central shoot of Scotch-fir. It is, however, more often found in dead shoots of the previous year's growth, eating out the pith. The stem or shoot which contains a larva may be known by its decayed or sickly appearance, the needles being shrivelled and brown.

SOCIETIES.

THE ENTOMOLOGICAL SOCIETY OF LONDON met on April 1st, 1896. Mr. Champion exhibited, on behalf of Mr. Blatch, SPECIMENS OF *QUEDIUS RIPARIUS*, KELLNER, captured in February last on the banks of running streams at Porlock, Somerset. He remarked that the insect was an interesting and unexpected addition to the British list, and the second recent novelty from the west country, the other being *Ochthebius lejolisi*, Muls. and Rey, found at Ilfracombe, in June last, by Mr. Bennett. It would seem to indicate that further additions to our list of Coleoptera might be expected from the country South of the Bristol Channel. He added that Mr. Waterhouse had informed him that he had seen specimens of the *Quedius* from Wales and Scotland. Mr. Champion also exhibited a SMALL COLLECTION OF COLEOPTERA MADE BY MR. O. V. APLIN IN SOUTHERN TUNIS during various expeditions inland from Gabes. The collection included some interesting Tenebrionidæ of the genera *Pimelia* and *Adesmia*. Mr. Aplin noticed specimens of these insects impaled by shrikes. Mr. Goss exhibited, for Mr. Cameron, an APTEROUS MALE OF *MUTILLA CONTRACTA*, taken by Mr. Rothney in Barrackpore, India. The specimen was stated to be the first recorded instance in this species of a wingless male, and was also abnormal in having the thorax incised laterally. Dr. Sharp called attention to the fact that at a recent meeting of the Society (March 20th, 1895, see *Proc.*, 1895, p. x.) a specimen of a SUPPOSED DIMORPHIC FORM OF ONE OF THE SPECIES OF *DYTISCUS* was examined, and Prof. Stewart enquired whether any anatomical examination had been made of the sexual organs. He said that in the *Comtes Rendus Soc. Bordeaux*, 1894, there was an account of the examination of the sexual organs of the supposed second form of *D. marginalis* by Mons. Peytoureau, who came to the conclusion that it was really a distinct species, which he called *D. herbeti*. Dr. Sharp

suggested that there must be some doubt as to M. Peytoureau's conclusion, as there was a series of these double forms in connection with this genus, and it would be a very extraordinary fact if in one case the second form should be a distinct species, while in other species of the same genus the form corresponding to it should be only a variety. Prof. Poulton exhibited examples of the TYPE LABELS now in use in the Hope Collection at Oxford, and illustrated their employment by projecting on the screen, by the lantern, a photograph of the Westwood TYPES OF AFRICAN EUSEMLE described in F. Bates' "Matabele Land" (Lond., 1881). He said that such labels, having been once set up in type, could be reproduced in electrotypes very cheaply and efficiently. Black ink was considered better than red, on account of its greater permanence. Mr. Verrall said he was of opinion that no species should be described from a single specimen or type, but from many specimens, and he wished every so-called "type" could be destroyed as soon as a species had been described from it. Mr. Blandford exhibited a series of lantern slides showing the USES TO WHICH PHOTOGRAPHY COULD BE PUT IN ENTOMOLOGICAL ILLUSTRATION. The photographs shown included various *Saturiniidae*, *Vauesiidae*, species of *Manestra*, *Tipula*, *Ophion*, *Carabus*, *Lucanus*, *Sitones*, etc., as well as one or two examples of insect injury, and a view in Windsor Park showing oaks defoliated by *Tortrix viridana*. Mr. Blandford said that the photographs were taken without any considerable practice in photography; that good and well-set specimens were desirable for reproduction; the colour-values had to be arrived at by the careful use of orthochromatic methods, and a large lens of good focal length should be used. Careful attention had to be paid to the lighting of the objects, a point in which entomological experience was of great value. Prof. Meldola expressed surprise that photography had hitherto been so little employed in the illustration of works on Entomology. Prof. Poulton read a paper entitled "ON THE COURTSHIP OF CERTAIN EUROPEAN ACRIDIDÆ." The author said that these observations upon the courtship of Swiss *Acridiidae* were made in the exceedingly favourable weather at the end of August and beginning of September last year. He was much indebted to Mr. F. Jenkinson, of Cambridge, and Mr. V. F. Dickins for many independent observations and valuable confirmation. The observations were almost all made in the neighbourhood of the Weissborn Hotel, high above Vissoye, in the Val d'Amnivers. Prof. Poulton stated that Dr. Sharp had been kind enough to name the species referred to in the paper. Prof. Meldola expressed great interest in the paper, and said that the observation of the habits of insects in the field seemed to be much neglected by many entomologists. Dr. Sharp remarked that there was a greater variety in the organs capable of producing sound in the Orthoptera than was generally supposed.

THE NORTH LONDON NATURAL HISTORY SOCIETY met on March 26th, 1896. The Curator announced a donation from Mr. Bacot of lepidoptera from our "local district," including specimens of *Colias edusa*, *Thecla betular*, *Cossus ligniperda*, *Zeuzera pyrina*, *Dicranura vinula*, *Dipterygia scabriuscula*, *Chortodes arcuosa*, *Hydroecia nictitans*, *Triphosa dubitata*, *Scotosia rhamnata*. Exhibits: Mr. Prout, a series of *CARADRINA MORPHEUS* VAR. *OBSCURA*, TUTT, bred from ova from North London. Misses Simmons and Nicholson had both observed BEES AT WORK. The former lady had noticed that the bee does not curl its

proboscis every time it takes pollen, but flies about with it extended until it has quite a large amount of pollen sticking to it. Mr. Woodward had CAPTURED AT EPPING FOREST five *Amphidasys strataria* on March 22nd, where he had also found *Brephos parthenias*, just coming out.

REVIEWS AND NOTICES OF BOOKS.

The Butterflies of Sumatra.*

This list, as it is called by its authors, runs to just 200 pages. It is not at all a dry series of names, but is annotated throughout with remarks on the magnificent denizens, which haunt the woods to be found in the north-east of the island. This tropical island contains 8,000 more square miles than the British Islands, and its position, exactly bisected by the equator, makes it apparently a perfect paradise of butterfly life, 756 species of which are given as inhabiting the north-east of the island. The description of the island and of the collectors employed is exceedingly interesting, but even here cultivation is playing havoc with the insect fauna. "The plains were formerly entirely covered with large dense, lofty primeval forest, but this has had to make way for the miserable tobacco plant, the cultivation of which began about the year 1865. The primeval forest, once destroyed by fire and the axe, does not grow again, but is replaced by a high-growing and tenacious species of grass (*Imperata arundinacea*) . . . which now entirely covers all the ground temporarily unoccupied by tobacco. The cultivation of the nicotinous plant pays so highly and yearly so increases in extent, that there is now no forest whatever left in the true tobacco district of Deli . . . and as the *Imperata arundinacea* is not liked by any animal, there have disappeared, not only all the interesting pachyderms, but also all the butterflies whose food-plants are in the forests. Ten or twelve years ago, or even six or eight, certain species, for instance, the different black and brown *Euplocas*, were to be found commonly everywhere. But then all the forest had not been cut down; now these species are never seen, having retired to the well-wooded outer hills and mountains or to the boundaries of the tobacco districts."

Of the collectors we read:—"Our collectors were usually Battaks from the two mountainous zones; to places in the plains we usually sent two very clever Chinamen. The latter were most zealous if given some advance of pay, which allowed them to buy some necessary provisions and the never-to-be-omitted opium. On their return with their bag of captured butterflies they received the balance of their monthly salary, together with an extra bonus for any rarer spoil they may have been fortunate enough to capture. The Battaks received some rice and salt fish, enough to feed them for a fortnight, before leaving for the mountains, but as they are inveterate gamblers, and will not turn out of their villages until they have lost at some game of hazard every cent they possess, no advance in cash was given them." . . . In 1893 and 1894 Mr. de Nicéville induced three amateur collectors in British India to send down to Sumatra some of the well-known Lepcha collectors from Darjiling to Dr. Martin's care. These men met with very good success, though at first they were afraid to mix with

*A list of the Butterflies of Sumatra, by L. de Nicéville, F.E.S., C.M.Z.S., and Hofsath Dr. L. Martin [Calcutta: The Baptist Mission Press].

the cannibal Battaks, and refused to go to the mountains. However, after giving them a Battak guide and interpreter, they went off to the hills regularly, and did very well there.

There are many interesting notes on mimicry. One of these relates to a very peculiar endemic form of the female of *Papilio memnon*, Linn. "It belongs to the first form of female of the species, *i.e.*, the form which has no tail to the hindwing and is most like the male; the second form is also tailless, but has a large white patch on the outer half of the hindwing never found in the first form. This peculiar first form female has the 'epaulettes' (*i.e.*, the basal portion of the discoidal cell of the forewing on both surfaces) almost pure white, faintly tinged only with ochreous, so that it may perhaps be called cream-coloured. It probably mimics the second form female of *P. forbesi*, which also possesses similar white epaulettes, the first form lacking them altogether, and is therefore like the male. It may be urged against this theory that females of *P. forbesi* are very rare, especially the white-epauletted second form, Dr. Martin having obtained only two specimens of it, but this scarcity is probably more apparent than real, both sexes of *P. forbesi* occurring in equal numbers, but the males, coming down to the hill streams to drink, are caught in large numbers, while their less thirsty spouses keep only to the thick forest, where they escape the dangers of the butterfly net."

British entomologists will be greatly interested in the remarks on *Auosia archippus* (*crippus*), which has occurred in Malaya. The authors follow out mainly the line of argument taken by Dr. Buckell (*Ent. Record*, vol. v., p. 1) to whose article they refer, but refuse to accept *archippus*, Fab., as the correct name for the species, when *crippus*, Cramer, is so distinctly the older name. Of its distribution Mr. Nicéville writes:—"Mr. W. F. Kirby has already recorded it from Java. I now for the first time, I believe, record it from North Borneo, the late Mr. W. Davison . . . having sent me a male specimen from that island. The Rev. W. J. Holland notes that he has received it from Borneo and Java, also its occurrence in the Azores. In Part ii. of a new edition of Morris' *History of British Butterflies*, p. 72, it is stated to have been found in the Andaman Islands. Furthermore, the late Mr. E. F. T. Atkinson, in 1889, presented a female specimen of this species to the Indian Museum, Calcutta, which was captured on April 19th, 1889, by Mr. C. White, the chief officer on board the P. and O. s.s., 'Ravenna,' in the Straits of Malacca (which is at the point where the butterfly was caught only a few miles broad). It is, therefore, not at all improbable that the butterfly flew from either the adjacent island of Sumatra or from the Asiatic mainland."

The book is full of good, interesting and readable notes; scarcely a species is mentioned that has not some original observations on its variation and habits attached to it. It is very rarely that one meets a *List* of butterflies of an unknown country that one can read with pleasure. This one can be so read, independently of its value as a work for reference.

ERRATA. — Vol. vii., p. 293, line 35, for "*musculosa*" read "*vitellina*."—Vol. vii., p. 294, line 12 from bottom, for "Stiff hairs intermixed" read "Stiff hairs *not* intermixed."—Vol. vii., p. 320, line 21, for "*pyramidea*" read "*tragopogonis*."

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The Relationship of the lower Lepidoptera with Trichoptera.

By J. W. TUTT, F.E.S.

McLachlan, in 1865, and Speyer, in 1870, pointed out certain broad affinities between the Trichoptera and some families of the Lepidoptera. Packard, in 1863, suggested somewhat similar affinities, but no one thought of rejecting co-ordinal relationship between the two Orders. The general affinities then discussed have since been considerably amplified; but not until the meeting of the Entom. Soc. of London, March 4th, 1896, when Dr. Sharp made his remarkable statement, has any authoritative entomologist attempted to unite Trichoptera and Lepidoptera. That there is much to be said on both sides one must admit, but our views are against the union of the two Orders.

Commenting on the pupa of a species of *Micropteryx* (probably *semipurpurella*), which had been sent to him by Dr. Chapman, Dr. Sharp stated that he "considered the pupa to be that of a Trichopterous insect; most of its structures were those of Trichoptera, and the account given by Dr. Chapman of its emergence showed that this was essentially the same as that of Trichoptera. He remarked that the imago of this division of *Micropteryx* had been already shown to approach Trichoptera in several respects, and suggested that it should be treated as a group of Trichoptera whose larvæ are not aquatic in habits.* If this course were not adopted he felt clear that Trichoptera could not be maintained distinct as an Order from Lepidoptera. He remarked on the peculiar projection from the head of the pupa of *Micropteryx*, and suggested that it might be comparable with the head-vesicle of the nymph, or primary pupa, of Lepidoptera. He also called attention to the importance, for a classification of Lepidoptera, of obtaining a full knowledge of the structure and life-history of *Eriocephala calthella*."

This is positive enough, for an opinion, and it suggests to us that the consideration of some of our most generalised Lepidoptera, and the views held by various authorities with regard to them, might prove of interest.

Now that the generalised structure of certain moths has become recognised, there appears to be a tendency to assume that such moths

For the description of a Trichopterous non-aquatic insect, *vide* R. McLachlan on "Cases of *Enoicyla pusilla*," *E. M. M.*, vol. v., p. 43.—ED.

are closely related to each other. This assumption is, in a measure, true, yet it is likely to be misleading, if we group these generalised forms into a single super-family, rather than into separate super-families, each with the more specialised families, which have originated from or near to it, in connection with the stem form.

The most generalised of all our Lepidoptera is the Super-family ERIOCEPHALIDES. This comprises the British species *Eriocephala calthella*, *seppella*, *aruncella*, *aureatella*, *thunbergella* and *mansuetella*. Walter discovered that *E. calthella* had maxillæ constructed on the type of those of biting or mandibulate insects. Chapman has further discovered that the larvæ have remarkable prolegs and antennæ. The complete life-history of a member of this genus is one of the greatest desiderata of entomological science. Owing to the great difference between these and all other Lepidoptera, Packard divides the Order into two great divisions or Sub-orders. These he calls— I. Sub-order: LEPIDOPTERA-LACINIATA. II. Sub-order: LEPIDOPTERA-HAUSTELLATA. The LEPIDOPTERA-LACINIATA includes only the ERIOCEPHALIDES. Formerly the species in the single genus *Eriocephala*, at present comprising the Sub-order, LEPIDOPTERA-LACINIATA, were included in the genus *Micropteryx*. Meyrick still classifies them with the *Micropterygidae*, making the latter family consist of the two genera, *Micropteryx* and *Eriocephala*. This in no wise represents the facts, and Packard's method of setting them off as a Sub-order equivalent to all other Lepidoptera is preferable. Not only do the ERIOCEPHALIDES differ from all other Lepidoptera in the structure of the imaginal mouth-parts (maxillary lobes, mandibles, etc.), but also in the more generalised condition of the thorax and abdomen of the imago. The larva is quite unlike that of any other lepidopterous insect, and as far removed as can be imagined from the apodal larvæ of the true MICROPTERYGIDES. It has large 4-jointed antennæ and 8 pairs of remarkable prolegs. The neurulation of the imago is also highly generalised, and the wings are united with a jugum. In the two latter characters the ERIOCEPHALIDES resemble Trichoptera.

The general appearance of the imagines of the ERIOCEPHALIDES is not unlike that of the MICROPTERYGIDES, the next Super-family to be considered, as presenting more generalised characters than any other Super-family except the ERIOCEPHALIDES, just considered. So different, however, are these structurally from each other, that the MICROPTERYGIDES are placed in the Sub-order, LEPIDOPTERA-HAUSTELLATA by Packard. They are, however, very different from any other of the numerous Super-families in this Sub-order, and hence Packard gives them a separate division to themselves. He sub-divides as follows:—

Sub-order: LEPIDOPTERA-HAUSTELLATA	{	1. PALEOLEPIDOPTERA (Pupæ liberæ).
		2. NEOLEPIDOPTERA (Pupæ-incompleteæ and Pupæ-obtectæ).

The division which the MICROPTERYGIDES occupy alone is called PALEO-LEPIDOPTERA. It is characterised by—(1) The generalised form of venation. (2) The union of the fore- and hind-wings by a jugum. (3) The remarkable pupa in which the antenna, mouth-parts and limbs are free. (4) The enormous pupal mandibles, described by Chapman as being adapted for cutting through the dense cocoon.

(5) The strange apodal larva. This division, then, presents also the Trichopterid characters possessed by the ERIOCEPHALIDES, both as regards neururation and jugum.

The only other Super-family of Lepidoptera known at present to possess a jugum is HEPIALIDES. It also exhibits the generalised form of neururation characteristic of the Trichoptera, and hence, like the MICROPTERYGIDES and ERIOCEPHALIDES, may be said to possess certain Trichopterid characters. HEPIALIDES, however, although preserving these ancestral characters, has become exceedingly specialised in other ways, and, since the sum total of characters presented by a Super-family must be considered as a whole in determining its position, this Super-family must be placed far away from MICROPTERYGIDES, with which it shows no alliance except the general characters which both have retained from the Trichopterid ancestors from which they originally sprung. On these grounds, Packard has placed HEPIALIDES in the division NEO-LEPIDOPTERA, and not with the MICROPTERYGIDES in PALÆO-LEPIDOPTERA. He says that the HEPIALIDES should be placed very near the base, although they present in their boring larval habits, in the reduced maxillary and labial palpi, and the entire absence of a haustellum and of mandibles, a considerable degree of modification compared with the Micropterygidæ.

It will thus be observed that we have three Super-families of the Lepidoptera which present close affinities with the Trichoptera, and yet, considered from all points of their structure, bear no very close relationship to each other. So little is yet known of the remarkable PROTO-LEPIDOPTERA (ERIOCEPHALIDES), that we can only follow Chapman and Packard in our consideration of them; but MICROPTERYGIDES and HEPIALIDES give us some tangible ground to go upon.

Those entomologists who refuse to look at anything besides neururation and wing peculiarities, have observed the striking resemblance of the neururation of these three otherwise unlike Super-families, and when they have found this to be supported by the presence of the jugum or yoke, by which the wings are held together, they have immediately jumped to the conclusion that these Super-families are in reality closely allied. On these grounds Comstock united them into the Sub-order, JUGATÆ, and Meyrick (on imaginal characters) follows suit. Now it is easy to see that the whole value of the characters, which have been worked out with so much care and patience, are in danger of being entirely misunderstood. We have already seen how Packard clears up what has been an actual, and is still a probable, source of error; and Chapman has had to do the same.

Chapman has shown, indeed, that even on neurational grounds alone these authorities are wrong. He shows that "the cell does not exist as such in PALÆO-LEPIDOPTERA (Packard), but is a most definite feature in the higher NEO-LEPIDOPTERA (Packard). In *Hepialus* the formation of the cell has already made definite progress, and so, treated from a neurational standpoint alone, it is possible to place *Hepialus* in the NEO-LEPIDOPTERA, and separate it from the MICROPTERYGIDES." To substantiate his position, he argues: "Supposing the maxillary palpus had been taken as the structure on which to base a classification, we might then have started with the PALÆO-LEPIDOPTERA, progressed through certain TINEINA, reached the PYRA-

LIDES, and then might have placed the HEPIALIDES above these. This illustrates the absurdity of treating a single character in a mechanical or Linnaean manner, and serves also to show the importance of handling your one structural character in a proper way. It serves also to show, as might be shown from half-a-dozen other characters, that *Hepialus* belongs to the Neo- and not to the PALEO-LEPIDOPTERA, and that a wide gap exists between *Hepialus* and *Micropteryx*, a gap vertically, as well as laterally. Different forms of the lowest NEO-LEPIDOPTERA have retained, in different degrees, different characters of the PALEO-LEPIDOPTERA. The HEPIALIDES happen to have retained especially certain wing characters, but they have diverged as regards maxillary palpi and some other imaginal characters, such as ocelli and tibial spurs, both characters which are up to this point in a very unfixed state; they have also largely diverged as regards larval and pupal characters. A larva with well-developed prolegs, and a pupa with so many parts well fixed, cannot belong to the PALEO-LEPIDOPTERA. It would be quite as correct to place *Heterogeneidae** in the MICROPTERYGIDES (Paleo-Lepidoptera) because all (1—7) the abdominal segments of the pupa are free, as to place *Hepialus* there because it retains the jugum and additional veins to the hind-wing."

The error into which Meyrick has fallen, and which Dr. Chapman has pointed out, is one into which any superficial worker can easily fall. We were astonished, however, to read in *Nature* (March 26th, 1896), in a review of our little book on *British Moths*, the following (by Mr. W. H. F. Blandford):—" *Hepialidae*, *Micropterygidae* and *Eriocephalidae* are separated from each other by numerous families, although the position, remote from all other Lepidoptera, that has been assigned to the three, is one of the most important and widely-accepted of recent changes." This is true in a measure. The ERIOCEPHALIDES and MICROPTERYGIDES are remote from all other Lepidoptera, up to a certain limited point. The latter, however, probably forms the base from which the Adelid, Tineid and other families which have largely preserved the maxillary palpi arose, and, therefore, these families must of necessity be brought into close connection with and cluster around their stirps.

On the other hand, the HEPIALIDES probably represent the stirps from which the Zeuzerids and Cossids arose (maybe even the Zygaenids are high along this line of development). The cell in the fore-wing of *Zeuzera* is directly traceable from that of *Hepialus*, and that of *Cossus* is also near. Other characters, particularly larval and pupal, also suggest affinities, and hence, in any system of classification, the families represented by these must be brought into close connection with HEPIALIDES. Of this Speyer says, in his interesting paper (*Stett. Ent. Zeit.*, 1870), that the neuration of *Hepialidae* and *Cossidae* is very similar, and that they resemble the Trichoptera no less than the *Micropterygidae*, though the *Hepialidae* exhibit other close analogies to the Trichoptera. He adds that the middle cell of the wing in the *Phryganidae* is not fundamentally different from that of the *Hepialidae*, *Cossidae* and *Micropterygidae*. He further associates the *Zygaenidae* with the *Cossidae*, *Cochliopodidae*, *Heterogynidae*, *Psychidae* and *Hepialidae*, and remarks that all these families are isolated among the Macros

* Includes the two British species *Limacodes asella* and *Heterogenea testudo*.

(p. 221). Chapman says that in neuration we find the next stage (in the evolution of the discoidal cell) to that observable in *Hepialus*, "in *Zeuzera*, and we pass on without any great hiatus to *Cossus*. In several higher groups, and especially in many Tortricides, certain records of the later stages of the process remain. A similar evolution may be traced in the Tineid stirps."

The most recent work on the subject, therefore, suggests that the MICROPTERYGIDES is the remnant of the ancestral stirps from which the ADELIDS, etc., have been derived, whilst HEPIALIDES is the remnant of another ancestral stirps, from which the Zeuzerids and Cossids have been derived. We have yet to learn that the characters which both have in common with the Trichoptera, ally them very closely to each other, or that it is scientifically correct to unite two such dissimilar bases in the same Sub-order—JUGATÆ—as is done by Comstock, instead of with those more specialised families which have sprung from them.

We have seen, then, that the JUGATÆ as a Sub-order cannot stand, but that each of the Super-families included therein must be grouped, as it were, with the higher or more specialised families which have sprung therefrom, if the system of classification adopted is to exhibit any real relationships. In the same way it is possible that, as our information becomes less fragmentary, many of the Super-families in Chapman's INCOMPLETE will be shown to lead directly or indirectly to Super-families now included in OBTECTÆ, so that these names will fall, so far as indicating relationships, and this we take it is the ultimate end of all systems of classification. At the same time we trust that we have shown that one can be logical, and yet (in a book) separate *Hepialidae*, *Micropterygidae* and *Eriocephalidae* by numerous families, and that their position, remote from all other Lepidoptera, except in the restricted sense that we have explained, is not a very widely-accepted change, however important it may be.

Entomology, Evolution, and Romance: a plea for a new departure.

[A CRITICISM OF MR. FROST'S ARTICLE].

By H. H. CORBETT, M.R.C.S.

The somewhat extraordinary essay under the above heading, which appeared in *The Entomologist's Record*, vol. vii., No. 12, should not, I think, be allowed to pass without some comment, and with your permission I offer a few criticisms on passages selected *seriatim* from it.

"A dictionary states that entomology treats of insects; this would be more correct to-day if put in the past tense." Why in the past tense? Does not entomology to-day treat of insects? Is not every insect in itself "a definite coherent heterogeneity," which in its life-history has undergone changes from a state of "homogeneity" (ovum); and are not our entomologists of the new school endeavouring to work out the meaning of the various stages, the "history of the steps?"

"Mr. Herbert Spencer laid down the rule, "That no analytical truths, no combination of analytical truths, can ever make up that synthesis of thought which alone must be the interpretation of the synthesis of things. He fortunately never carried this principle very far towards its logical conclusion, &c." Quite true, analysis, whether chemical, or by the scalpel, can never result in synthesis. But when

a thing, the result of synthesis, *e.g.*, imago, is presented to us in various stages of its synthesis, *e.g.*, pupa, larva, and ovum, and all the varied states of each of them, we can, by analysing each stage of its existence, arrive at some sound data upon which to form "the interpretation of the synthesis of the thing." Surely if entomology be a science, "the means are justified by the end proposed," the furtherance of truth. "What are the ends proposed by entomologists to-day? Are they not many in number?" Yes! "And chaotic in direction?" No! They are *varied* in direction. One may be studying the embryology of insects, another the differences in imaginal structure, yet another their habits in a state of nature. But all who are *entomologists* are endeavouring to add some new fact or sound theory to help explain the why and how of life.

"The man in the street" knows little, and cares less, of the doings of the vanguard in any branch of science. The names of the great leaders—the Huxleys and Tyndalls—are known to him; the lesser lights working each in his own special line are unknown. Hence the difference.

On the subject of nomenclature I will not touch, as it is somewhat outside the title of the essay.

The suggestion that Dickens' American spiritualist possessed the right type of mind for a practical naturalist, the "kind of person" that "should be sent into the field to observe and to collect facts," is truly beautiful! "He can be absolutely trusted" to fail to distinguish "bosh" from sense, even when the bosh is palpably due, as bosh ever is, to error.

Then in the next paragraph we meet once again the old! old!! story of the certainty of the theories of philosophers being sooner or later contradicted. Where are the philosophers of to-day who contradict the laws of gravitation; the spheroidal form of the earth, or the fact that the earth revolves round the sun, and not *vice versa*? Of course, when a great new philosophy begins, there are sure to be among its exponents some who make mistakes, and such mistakes are certain, sooner or later, to be corrected; but the truth of the original philosophy is not thereby shaken.

The "Will of the Wisp" metaphor is not a happy one, because, as I have endeavoured to show in the last paragraph, facts do *not* decompose.

In support of his argument the essayist goes on to mention the fossil insects that have been found in the Kainozoic and Mesozoic rocks, and after telling us that all such insect remains are referable to well-known recent groups, he adds, "These facts are suggestive. How far beyond the Palæozoic epoch must we look for the parent types of each division, letting alone their common parent?" I quite agree that these facts are suggestive, but other equally suggestive facts are omitted. It is quite unnecessary to go "beyond the Palæozoic epoch," wherever that may be, but if such insect remains as have been found *in* the Palæozoic deposits be examined, they will be found to be of very generalised and archaic types. Such remains have only been found, so far as I know, in the Devonian and Carboniferous formations. The vast ages represented by the Laurentian, Cambrian and Silurian rocks tell us nothing except that the period occupied in depositing them was infinitely greater than that occupied by the whole of the Secondary and Tertiary periods together.

"You cannot leave out geology." No! and we do not want to, but we do want to trace out a parallel between the life-history of each species and its probable evolutionary history, as told to us in very fragmentary evidence by fossils.

In reference to the tirade against the written works of Darwin, Huxley and Tyndall, I can only echo the sentiment of the editorial foot-notes.

As for the "new departure," the idea is pretty, and if it could be put into practice I believe that all good naturalists, whether of our particular cult or otherwise, would welcome it; but I don't think that "the man in the street" would come in great numbers, even to see living insects and to learn what a "living museum" could teach about them. Is there not at Westminster a large building erected for the purpose of letting "the man in the street" have an opportunity of studying the habits of living fish? Has it been a great success?

By all means let us do all we can to educate the crowd to a due appreciation of the charms of nature, but at the same time do not let us quarrel with those who are ahead of the crowd, and are prying further and further into nature's secrets, even though the facts that they elucidate may seem, when taken separately, to be uninteresting to the general.

MIMICRY.

II. THE ORIGIN OF PROTECTIVE WING MARKINGS. INTERNAL FORCES PLUS SELECTION AND UTILITY.

By J. W. TUTT, F.E.S.

In our previous considerations (*ante*, pp. 1—4) we have reached the point at which "selection and utility," on the one hand, and purely "internal forces" on the other, have been suggested as the cause of the complicated protective wing-markings found in many butterflies. In this we shall attempt to show that both "internal forces," and "selection and utility" take part in their production.

The complexity of many wing-markings is stated, by Weismann, to be due to the inheritance of the patterns of all the ancestral species, the inherited patterns having been effaced, preserved, or modified as new designs became necessary. But, although the markings rose conformably to law, yet "the laws involved, *i.e.*, the physiological conditions of the variation," have been subservient to the ends of a higher power—utility, which primarily determines the kinds of colours, spots, streaks, and bands that shall originate, as well as their method of disposal. The physiological conditions "come into consideration only to the extent of conditioning the quality of the constructive materials—the variations, out of which selection fashions the designs in question." With this we quite agree. Internal forces condition the quality of the material; selection, guided by utility, fashions the designs.

It is the principle that the formation or fashioning of these patterns is brought about by internal forces, to which Weismann objects. He states that formative laws of the kind suggested by his opponents, imply that "definite spots on the surfaces of the wings are linked together in such a manner by inner invisible bonds, as to

represent the same spots or streaks, so that we can predict from the appearance of a point at one spot, the appearance of another similar point at another, and so on. It is an undoubted fact that the markings frequently exhibit a certain symmetry," or, as Bateson* puts it, "a meristic representation of equivalent design elements occurs." Yet, Weismann thinks that "we should be cautious in deducing laws from these facts, because all the rules traceable in the markings apply only to small groups of forms, and are never comprehensive nor decisive for the entire class, or even for the single sub-class of diurnal butterflies, in fact, often not for a whole genus. All this points to special causes operative only within the group."

We are not inclined to lay so much stress as Weismann, on the facts he points out. He has himself previously stated that the inherited patterns have been greatly modified, that the wing was "even at its origin, far from being a *tabula rasa*, but was a closely-written and fully-covered sheet, on which there was no room for new writing until a portion of the old had been effaced." It appears to us to want only a very slight application of this principle, in various directions, to understand why the rules traceable in the markings apply only to small groups of forms. At the same time we are inclined to agree with him, that some more general characters would be traceable through a larger number of species if the markings were entirely produced, governed and moulded by internal forces.

Weismann then asserts that "if internal laws controlled the markings on butterflies' wings, we should expect that some general rule could be established requiring that the upper and under surfaces of the wings should be alike, or that they should be different, or that the fore-wings should be coloured the same as, or differently from, the hind-wings. But, in reality, all possible kinds of combinations occur simultaneously, and no rule holds throughout. Or it might be supposed that bright colours should occur only on the upper surface, or only on the under surface, or on the fore-wing, or only on the hind-wings. But the fitness of the various distributions of colours is apparent, and the moment we apply the principle of utility we know why, in the diurnal butterflies, the upper surface alone is usually variegated, and the under surface protectively coloured, or why, in the nocturnal butterflies the fore-wings have the appearance of bark, of old wood, or of a leaf, whilst the hind-wings, which are covered when resting, alone are brilliantly coloured. On this theory we also understand the exceptions to these rules. We comprehend why Danaids, Heliconids, Euploids and Acraeids, in fact, all diurnal butterflies offensive to the taste and smell, are most brightly marked, and equally so on both surfaces; whilst all species not thus exempt from persecution have the protective colouring on the under surface, and are frequently quite differently coloured there from what they are on the other."

This paragraph wants examining carefully. One is struck by the excellent way in which Weismann presents his facts as to the utility to the individuals of the actual existing patterns of coloration which are to be found in various groups of butterflies and moths. Yet, we are not sure that the first part of the paragraph is convincing.

* *Materials for the Study of Variation with especial Regard to the Discontinuity in the Origin of Species.* London, 1895.

There seems to be no reason why, if internal laws were assumed to control the markings on butterflies' wings, they should not be as complicated as if controlled by external forces. On the contrary, we are ready to admit that any number of combinations might occur in the markings even as a result of internal forces, for Weismann has elsewhere explained to us that the determinants which give rise to the various structures are largely independent, and that, therefore, the determinants which produce respectively the scales of the upper and under surfaces, may be, and probably often are, developed quite independently, and therefore may be modified quite independently. We have no doubt ourselves that "the root of the internal selective processes lies in that place where it is determined what variations of the parts of the organism shall appear," and that when the internal forces have produced the variations, and conditioned the quality of the constructive materials, then selection directed by utility fashions the designs. It seems to us that, in producing the final result, either the external or internal force is impotent without the other.

But, when it comes to the consideration of the actual designs and patterns that the combinations have taken, then we confess that the supposition that they have been developed by internal forces, appears untenable, and we are quite ready to agree that the particular combinations have been brought about as suggested by Weismann. Utility, there can be no doubt, does show us in what direction it has caused natural selection to act, and does show us why the various mimetic patterns have been evolved, and we can suggest no other factors but selection, guided by utility, capable of evolving them.

On the value of rare British Lepidoptera.

By Rev. J. GREENE, M.A., F.E.S.

In the April number of the *Entomologist's Record* is an article signed "John Bull," in which I think I recognise the hand. Be this so or not, I wish to express my most cordial approval of every part of it.

I have long since ceased to care for "Rarities," so-called, and have removed from my small collection such species as *Pachetra leucophaea*, *Ennomos autumnaria*, and others. I have noticed that after a sale, you, and others, have remarked that such and such a collection (or certain rare insects in them) went for comparatively nothing—assigning as the reason the absence of any "history" of it, or its contents, such as "labels," "locality," "from whom received, etc." But of what value is such a history? What is to prevent a collector or dealer from attaching such a label, or locality or name, to any insect that he thinks worth the trouble? In these days of importation—of eggs, pupæ, etc.—of what value is the declaration—honest or dishonest—that the insect was bred by self, on such a day, and in such a locality? I would not accept as a gift any rarity or novelty captured during the last thirty years. The donor, whether amateur or dealer, may be absolutely honest, but—"Quis custodiet custodes?" How is he to prove that he himself is not the victim of a fraud? As to "dealers," I have bought for many years insects from Messrs. Harwood, W. and T. Salvage, but they know that I never buy a "rarity." My experience goes back to a period when the "dealers"

as such were almost unknown. When it began (*i.e.*, the business) it spread by leaps and bounds, and speedily produced such men as Parry, Button—"et id genus omne." I crossed the Channel (in 1869) in the same steamer as a dealer, who triumphantly showed me *D. compta* on his setting-boards! I observed a discreet silence. Very shortly afterwards it was proved beyond dispute that he had brought foreign pupæ with him from London so as to emerge at Howth. But the most bare-faced fraud of all was the attempt to palm off three specimens of *Glyphisia crenata* as having been taken at Howth! Now the food of *G. crenata* is strictly confined to poplar. The island of Howth is about the last place in the world to take *G. crenata*. I know Howth as well as I know my own house, and can safely affirm that there has never been a poplar tree in it—at any rate, not up to the time when this fraud was attempted. *Per contra*, I must speak in very high terms of Harwood, of Colchester. I have known him well for many years. Of course, strictly speaking, he is a dealer, but far superior in every way to the average specimen, and, as he is well-known, I am sure your readers will agree with me. It does not affect me much, for, as I have already said, I have long since ceased to feel any interest in "British" (?) rarities, and confine myself to varieties, and interesting or unusual forms of common things. I have, of course, some rarities, but they belong to a bye-gone age. Some, as *Larlia canosa*, *Agrotis subrosea*, *Phibalapteryx polygrammata*, and others, I owe to my old and generous friend, the late H. Doubleday; and others to my own efforts, as *Aporia crataegi*, *Polyommatus acis* (*Nomiales semiargus*), *Lycaena arion*, *Glyphisia crenata*, etc. I feel sure that (financially) all labels, localities, etc., are utterly valueless, for the reason already given.

An explanation of the Melanochroism occurring in certain Scotch specimens of *Tryphæna orbona*, Hufn., Fab. (comes, Tr.).

By J. W. TUTT.*

The various dark aberrations of this species which have been obtained in certain areas of Perthshire, Aberdeenshire, Moray, Sutherland, the Orkney Islands and the Isle of Lewis, were for a time unscientifically grouped under the name of *ab. curtisii*, Newm. In *British Noctuae and their Varieties*, Vol. ii., p. 96 (1892), the chief dark forms were differentiated as follows:—

1. Fore-wings dark brown with red costa = *ab. curtisii*, Newm.
2. Fore-wings black = *ab. nigrescens*.
3. Fore-wings black with red costa = *ab. rufo-nigrescens*.
4. Fore-wings black, hind-wings also almost black = *ab. nigra*.

To combine the perfectly black and rich brown (with crimson costa) specimens under the same aberrational name is absurd.

There can be no doubt which form Newman meant to designate as *curtisii*, for he quotes Curtis' figure and description, the latter "Brown with the costa reddish; two pale strigæ towards the base; an oblique, oval, and an auriculate, stigma, with pale margins and reddish centres, beyond which are two pale sinuated strigæ, the nervures between them pale, and bearing a row of dots, as well as the posterior margin; the inferior wings orange, fuscous at the base, the

* With many thanks to Mr. McArthur.

nervures fuscous, a black fimbria, narrow at the anal angle, curved above and reaching the centre, where it forms a crescent, the extreme edge indented and not touching the margin, etc." It may now be well asked how many of the beautiful aberrations sent to us from Scotland under the name *curtisi* really belong to this aberration. Mr. Curtis' type specimen was taken *on the heath* at the back of Mr. Kean's house, in the Isle of Bute, on the 27th of July, 1825.

Throughout the wide geographical range of *T. orbona*, *i.e.*, over the whole of Europe to 59° N. lat., Western Asia, and Northern Africa, the insect is very little subject to striking variation. An increasing development of the transverse lines in the specimens from the Scilly Isles and certain Mediterranean localities being the most striking feature. It is only in the extreme north-west of its area, *i.e.*, the west, north-west and north of the British Islands, that the variation becomes marked, red replacing the ordinary grey and ochreous-grey on the western shores of Ireland; whilst in certain restricted parts of Scotland it assumes deep mahogany-brown, black and crimson colorations, which are never seen elsewhere.

Now, a very pretty theory might be formed (as, indeed, has already been done by Mr. Adkin), that this change is due to cold, since the tendency to dark variation is only found in the more northern portions of our Islands; but, unfortunately for the theory, (1) the districts in which such melanism is found are exceedingly warm and mild; * (2) the aberrations are not found in the same latitudes on the Continent, where the mean temperature is much lower, and the atmosphere drier than in Scotland.

Now, whatever may be the cause acting within the organism to give rise to the necessary variations presenting themselves, there can be no doubt that the useful variations presented are seized upon by natural selection, and the directive external force is, in this case, undoubtedly due to the actual environment of the species. The peculiar variations present themselves for selection; the habit of the dark specimens is to rest on the heaths, peat, etc., in the localities in which they occur; the variations tending to darken the ground-colour are those most useful to the species; selection (guided by utility) at once seizes these dark variations, and the melanic forms are the result.

We are often led to regret that our professional collectors give us so little of their actual field experience to help us in our attempts to explain the phenomena connected with our favourite study. At a meeting of the South London Entomological Society, on April 23rd, Mr. McArthur, whose experience with dark forms of this species is almost unequalled, stated that he considered the dark coloration of the melanic forms of *T. orbona* to be entirely protective. In the places it haunted—heaths and peat-bogs—it had an entirely different habit from that which it was assumed to have in our southern counties (*viz.*, resting under leaves, etc.), for it rested on the ground, and could not hide beneath green leaves, where the latter were not forthcoming for it to hide beneath. The dark form of the insect was to be found resting by day upon the black peat, and it was quite possible for the insect to

* "Rannoch and Forres can scarcely be compared; the former is a high-lying, cold, inland district; the other, low-lying, warm (Forres is one of the mildest and driest places in Scotland) and maritime" (F. B. White, *E.M.M.*, vi., p. 190).

be thus resting, whilst one looked straight at it without discovering it, so perfectly was it protected. He had repeatedly found them sitting thus, but only after much close searching, and he had often been struck by the marvellous way in which they were protected. It was further remarkable that at Forres, both dark and light forms of *T. orbona* occurred, but whilst there was some little intermingling, as might be expected, in contiguous areas, yet, it was remarkable how large a proportion of the dark specimens was strictly confined to the low-lying peaty ground, whilst on the drier and higher land, and in the woods around, the ordinary grey forms, such as were found in the Southern counties, occurred almost entirely. On the sand-hills, at a very short distance, only the most ordinary grey forms were to be obtained, the dark forms scarcely appearing, even as a rare aberration, although one might reasonably expect that specimens of a strong-winged species like this would cover a large area easily enough when on the wing.

In Orkney, only melanic specimens of *T. orbona* are found; no grey ones have ever been taken. Here they occur entirely on peaty land, and the pale form has become entirely eliminated. In the Island of Lewis, again, pale and dark forms were found, the conditions of environment being, however, different for the different forms.

Such evidence as this is of the highest value, and it is to be regretted that Messrs. McArthur, Reid and Salvage are so chary of recording their observations. There can be no doubt, as we are attempting to show in our papers on "Mimicry," that the same general laws hold good all round. (1) The germ contains endless variational units. (2). These compete amongst each other by intra-selection. (3) Forces (nutrition, moisture, temperature, etc., etc.) acting on the organism determine which variational units shall be most successful. (4) Selection chooses those variations that will be most useful for the protection of the organism, and directs them into lines that will serve best to protect it.

It may be asked, what influence we think the excessive moisture of some of the areas, where these forms occur, has in moulding the melanism of this species. The influence it certainly has is to intensify the blackness of the peat and heath, and hence to aid in intensifying the blackness of the species, the specimens of which respond, under the above conditions, to the environment. It may also be a factor that gives certain variational units (Weismann) an advantage, and aids them in their struggle against other units, *i.e.*, it may be a factor in the process of intraselection.

SCIENTIFIC NOTES AND OBSERVATIONS.

AN UNUSUAL PAIRING OF TÆNIOCAMPID SPECIES.—I have been extremely busy of late, working fallows near here, and have done extremely well. I took a male *Tæniocampa stabilis* in copulâ with a female *T. munda*. The latter laid about 160 eggs, which have changed colour, and will, I believe, prove fertile.—W. HEWETT, 12, Howard Street, York. April 17th, 1896.

THE GENERA IN THE APATELIDÆ.—Now that Dr. Chapman has given us his authority that "not only are *Cuspidia*, *Viminia* and *Bisulcia* good genera, but that *Cuspidia* must be sub-divided into genera, much

like the sub-genera into which Mr. Grote divides the section," we know where we are, and as the discussion (which must have appeared to occupy a space quite unproportioned to the value achieved, to many) has led Professor Grote to work out the correct application of the names according to the law of priority, the average entomologist can now, by the application of a little common sense, draw up a satisfactory nomenclature for working purposes.

This, then, will be as follows :—

Family : APATELIDÆ.

Sub-family : ACRONYCTINÆ.

Tribe : CUSPIDI.

ACRONICTA, Ochs.

LEPORINA, Lind.

APATELA, Hb.

ACERIS, Linn.

CUSPIDIA, Chapn.

MEGACEPHALA, Fab.

HYBOMA, Hb.

STRIGOSA, Fab.

TRIENA, Hb.

PSI, Linn.

TRIDENS, Schiff.

JOCHÆRA, Hb.

ALNI, Linn.

Tribe : VIMINIDI.

PHARETRA, Hb.*

AURICOMA, Fab.

MENYANTHIDIS, View.

EUPHORBIE, Fab.

var. MYRICÆ, G.

RUMICIS, Linn.

ALBOVENOSA, Göze.

Tribe : BISULCIDI.

CRANIOPHORA, Sdell.†

LIGUSTRI, Linn.

We think that lepidopterists could not do better, now that a final conclusion has been reached, than use the above synonymy in their work and communications to the magazines.—J. W. TUTT. *April*, 1896.

BROTOLOMIA METICULOSA DOUBLE-BROODED.—Mr. E. F. Studd has fallen into a curious error (unless the printer has substituted another name for the one he intended) in his note on *Brotolomia meticulosa* (*Ent. Rec.*, vol. vii., p. 318), for Newman says most distinctly :—“The moth appears in May or June, and a second brood is out in September” (*British Moths*, p. 404). As far as my own very limited experience goes, this common species is more abundant in the second brood than the first. I have taken and bred it in April, May and June ; and the second brood in August, September and October, in this district.—W. GROVER, Kent Villa, Harvey Road, Guildford.—*April* 13th, 1896.

**Viminia* and *Arctomyia* are generically synonymous with *Pharetra*. †*Bisulcia* is generically synonymous with *Crauiophora*.

CURRENT NOTES.

Mr. G. C. Champion (*E. M. M.*, May) adds *Amara famelica*, Zimm. to the British list, from specimens captured in the neighbourhood of Woking and Chobham (September 10th). It occurs in sandy places on heath, chiefly in the spring and autumn, in company with the extremely local *A. infima*.

Lord Walsingham has re-examined Zeller's series of *Argyresthia illuminatella*. The oldest specimens have on them two names—“*illuminatella*, Ti.,” and the unpublished one, “*glaberrimella*, Z.” The true *illuminatella*, as described in the *Isis*, 205 (1839), Lord Walsingham considers, does not agree with Salvage's captures, which may probably turn out to be an unsuffused form of *A. praeocella*.

A. atmoriella (which was also included in Zeller's series of *A. illuminatella*) is quite distinct.

Mr. C. G. Barrett has added (with as many suggestions of doubt about his own action as we remember having seen) another species to the Leucaniids of the world. We have waded through his long description (why do describers not give us the salient specific points they rely upon?) and make it agree with *L. impura* ab. *punctilinea* (*Brit. Noct.*, i., p. 40). These are the points that Mr. Barrett relies upon for its specific claim:—"The somewhat greater robustness of the thorax, the greater breadth and different shape of the fore-wings, their very peculiar colour and texture." He further adds, "I know of no connecting link to unite the form which I have here described with *L. pallens*, yet, from the presence and position of the three round black dots (when visible), a very close alliance to that species must be admitted." We should like to see these specimens before giving an opinion as to whether *faricolor* is a distinct species. The specimens came from the Essex (or Suffolk?) coast last July.

Dr. Knaggs has devised a method for "dry relaxing" small lepidoptera. He procured an "accurately stoppered, wide-mouthed, three-ounce bottle, a piece of sheet cork was cut in the form of a circle of a diameter a trifle less than the mouth of the bottle, while a long pin, stuck in its centre, served as a handle. Into the bottle two drachms ($\frac{1}{2}$ oz.) of sublimated naphthalin, with six drops of wood naphtha, were introduced; the insects, pinned on the stage alluded to above, with their wings kept well away from the cork, were then lowered into the bottle and the stopper replaced." In 48 hours relaxation was apparently complete. Ordinary albo-carbon is not so satisfactory for this purpose as the pure naphthalin.

At this time of the year we cannot do better than call attention to Gräff-Krusi's excellent nets, which fold into an exceedingly small compass. All our collecting during the last two years has been done with one, and it has proved remarkably serviceable.

Mr. E. Cornell records a specimen of *Phigalia pedaria*, only fifteen-sixteenths of an inch in expanse.

Dr. Knaggs is anxious to re-open the old, old question of the introduction of *Clostera anachoreta* into Britain.

Mr. G. C. Green recorded in the *Field* the occurrence of *Cyaniris argiolus* and *Pararge aegeria*, in South Devon, on March 30th.

Mr. Shephard-Walwyn records the pairing of *Taeniocampa stabilis* ♂ and *T. gothica* ♀, also of *Hybernia marginaria* ♂ with *T. pulverulenta* ♀.

Mr. Morris records the capture of *Plusia moneta* in a garden at Wallington, Surrey, in August, 1894.

The Rev. O. P. Cambridge writes:—"The spot where I and Bond took *Cleora riduaria* in tolerable abundance (in the New Forest), appeared to me (in 1895) to be quite unaltered, with nothing, so far, to lessen the likelihood of its occurring there now; and its food (supposed, I believe, to be the lichens on the old oaks) is certainly still in abundance. I heard from a local collector there, Mr. C. Gulliver, that it had not been taken for a great many years. It was unknown to the latter, and, indeed, he did not know the exact locality where it used to occur, nor the method of working for it. This, I suppose, accounts for the long price that this pretty moth fetches when now brought into the market; but I would ask whether any

serious collectors do now ever work for it in the right place, in the right way, and at the right time? I think the 'pretty widow' can only be in hiding. *This*, however, is not, I fancy, generally considered to be the habit of those of whom the sapient Mr. Weller bid Samivel 'beware!' The Rev. O. P. Cambridge does not hint at the "right place," the "right way," or the "right time." Could not he give the secret to an absolutely trustworthy amateur collector (there is one, a rather near neighbour of his, to go no further) to test whether *C. riduaria* be still an inhabitant of the New Forest?

NOTES ON COLLECTING, Etc.

HYBERNATING LARVÆ.—The larvæ that I sleeved out for the winter appeared, in the middle of March, to be, on the whole, in good condition. A batch of *Phorodesma smaragdaria* have wintered most successfully, sleeved out on Southernwood or "Old Man." *Geometra papilionaria* larvæ were already nibbling the birch buds, whilst a few *P. bainularia* larvæ were promenading on their sleeve in the sunshine. *Lasiocampa quercifolia* were still sprawling on the naked stems of plum and sallow, and looking uncommonly like them too. When touched, they show their orange spots between the segments, which are very conspicuous against the dull dead brown of their bodies. Later on, when full-grown and grey, the blue in these spots predominates, if my memory serves me, as such a pampered menial should. Why is this? And why have such spots? Is the showing of them likely to frighten a bird, who thought that nice rotten piece of wood was good for building a nest? The protective colouring of the animal is marvellous, enough to deceive even entomologists, let alone birds; but when touched and showing off, these intersegmental glories are most conspicuous.—E. A. BOWLES, M.A., F.E.S., Myddleton House, Waltham Cross. April, 1896.

EARLY SPRING COLLECTING.—I paid a visit to Kinnoull Hill on the night of March 9th, and was very much surprised to find *Larentia multistrigaria* flying in abundance. I also paid three visits to the sallows in this vicinity during March (I may remark that sallows are scarce in the immediate neighbourhood), and found them literally swarming with *Taeniocampa gothica*, *T. stabilis*, *T. instabilis*, *Orrhodia vaccinii*, *Calocampa exoleta* and *Panolis piniperda*. At Easter, I went to Methven Moss to sweep for larvæ, and got a considerable number of those of *Orygia fascelina* in second skin, and *Bombyx callunæ*. Larvæ of *Plusia interrogationis* were very scarce, only five, nearly full-fed, being secured.—E. R. BUSH, 71, Strathmore Street, Bridgend, Perth. April, 1896.

The only fact of importance that I have to record is the great number of *Panolis piniperda* which have turned up at the sallows this year. I generally take about a dozen during the season, but this year they were most abundant, and came flying to the light in dozens.—MONTAGUE GUNNING, M.D., The Mall, Montrose. April 16th, 1896.

The male sallows in this neighbourhood began to show their anthers about March 23rd, but there were few moths on the wing at that date. On MARCH 30TH, fine night, the thermometer indicated 42° F. at 10 p.m., and I took *Taeniocampa opima*, *T. instabilis*, *T. stabilis*, *T. gothica*, *T. pulverulenta*, *S. satellitia* and *Calocampa exoleta*.

APRIL 4TH, wind west, thermometer indicated 40° at 10 p.m., *T. gothica*, *T. instabilis*, *T. stabilis*, *T. pulverulenta*, all very plentiful; *T. opima*, about a dozen specimens; *Lobophora carpinata* (*lobulata*), *Laurentia multistriata* and *Panolis piniperda*, *Saturnia paronia* (bred). APRIL 6TH, wind west, dry atmosphere. Moths not so plentiful as on the 4th; *T. gothica*, *T. stabilis*, *T. instabilis*, *T. opima*, *L. carpinata*, *P. piniperda* were captured, and *S. paronia* (bred). From April 8th to the 19th the weather was unfavourable for collecting. The wind was north, and there was frost at night (9° of frost on the 15th). This finished the sallows up in this locality for 1896.—J. FINLAY, Meldon Park, Morpeth. April, 1896.

The season here has so far been fairly good. *Nyssia hispidaria* was common in early March, and was followed by *Cymatophora flavicornis*, which was also abundant. *Epigrapbia arellanella*, which is usually common on the birches with *C. flavicornis*, was scarce this year. The common *Taeniocampids* have been abundant at sallows—*T. populeti* very common here, and *T. munda*, at York. *Amphisa prodromana* (*walkerana*) has been fairly common. Can anyone give me a hint as to how to find the larva of this species?—H. H. CORBETT, M.R.C.S., Hallgate, Doncaster. May, 1896.

The sallows are working well, all the usual things being fairly common. The beautiful deep red form of *Taeniocampa gracilis* appears pretty plentiful here this year, although usually rare.—W. SALVAGE, Kinloch, Rannock, Perthshire. April 26th, 1896.

DATE AT WHICH SALLOWS BLOSSOM IN SCOTLAND.—In his paper on *Tryphaena orbona* (*comes*), read April 23rd, Mr. R. Adkin suggested that cold was probably the factor that developed the melanic specimens of this species in Aberdeen, Moray, Sutherland, Orkney and Lewis; and although I pointed out that Dr. Buchanan White had repeatedly shown that the mean temperature of these areas was (except in the mountains) somewhat high, and the districts often remarkably warm all the winter months, whilst Mr. McArthur stated that the dark specimens lived on (or near) peat-bogs, Mr. Adkin insisted on his point, remarking that "If the temperature was not low, there was *something* peculiar in the atmosphere, for sallows were six weeks or more later than in England." Taking our own records in the last and present numbers of the magazine, we find that sallows were out at Perth "during March," Mr. Bush; at Montrose, "March 21st," Dr. Gunning; at Morpeth, "March 23rd—April 6th," Mr. Finlay; at Rannock, "April," Mr. Salvage; Hereford, "Middle of March to April 4th," myself; and so on. On the whole I should suppose that, leaving out the mountains, the sallows would have been in working order from March 15th to April 6th all over the British Islands, and in the mountains or hilly districts a fortnight later. Is there any ground for Mr. Adkin's assumption as to the late date that sallows blossom in Moray, whence most of our melanic *T. orbona* come?—J. W. TUTT. May, 1896.

POPULAR NAMES OF INSECTS: WANTED, INFORMATION.—Can any of your readers inform me as to what insect the "Back-swimmer" is? Is it the Boatman (*Notonecta glauca*)? The information is wanted for the English dialect dictionary. "Back-swimmers are rowing themselves about by the hind-legs." In Hampshire, some of the larger dragonflies are called "adder stingers." I have heard them so designated frequently, but I fancy the name is very local. Is this so?

I should be glad of any answer through the *Ent. Record* relating to these queries.—J. ANDERSON, JUN., Alre Villa, Chichester. *April 24th*, 1896.

NEW ENTOMOLOGICAL LANTERN.—I have had a new lantern made, from my own specifications, for entomological purposes, by Griffiths and Sons, Birmingham, and fitted with the patent burner of the Cera Light Co., Limited, Glasgow. The peculiarity of this latter is that it burns Cera (wax), a solid. A copper wire communicating with the Cera in the tank is curved in a spiral over the burner, and when the wick is lighted the heat is rapidly conducted down the wire, and the wax in the tank is melted. When the flame is blown out the tank rapidly cools, the wax solidifies, and the lantern may then be packed and carried in any position without greasing. A piece of the wax may be carried in the pocket, and the lamp replenished while actually burning if necessary. I think, with one or two slight improvements, it will make a useful lantern.—H. TUNALEY, F.E.S., 30, Fairmount Road, Brixton Hill, S.W.

NOTES ON LIFE-HISTORIES, LARVÆ, &c.

ON THE NUMBER OF BRITISH SPECIES OF OPORABIA.—LIFE-HISTORY OF OPORABIA FILIGRAMMARIA.—I have been much interested in Mr. J. A. Clark's account of *Oporabia filigrammaria*, because I am now breeding it myself. Mr. J. E. R. Allen kindly sent me a batch of about two dozen ova from Bolton. These hatched in February, from the 13th to the 26th, and now they have nearly all pupated. Mr. Allen wrote to me on February 13th, telling me that his also were hatching. These dates, it will be observed, exactly agree with those quoted by Mr. Clark, but are fully two months earlier than those given in his own observations. My larvæ have been fed up exclusively on whitethorn, the only food available when they hatched. In their later coats the general ground colour was a dark blackish-green, very different from any larvæ of *O. dilutata* which I have ever seen in Hampshire, and the yellow stripes on the very dark green make them striking and handsome larvæ. This darker colour may no doubt be owing to the particular district from which they came, but it seems to me to be worth noticing, for no one could mistake these for the usual form of the larva of *O. dilutata*.—J. C. MOBERLY, M.A., F.E.S., Rockstone Place, Southampton. *April 12th*, 1896. — [These notes by Mr. Moberly make it pretty certain that we have three species of *Oporabia* in Britain, as was long ago asserted by British lepidopterists. It is very necessary that these species should be well worked out now in all their stages.—ED.]

It may be well, in connection with the above, to call attention to a note by Mr. Kay, of Bury, Lancashire, who wrote on June 9th, 1876 :—"Wishing to obtain larvæ of *L. caesiata*, and, if possible, those of *O. filigrammaria*, I visited two localities in this neighbourhood, where I hoped to obtain both species; nor was I disappointed, although *O. filigrammaria* was not known to have previously occurred at one of the places worked. Some of the larvæ, especially those of *O. filigrammaria*, were found feeding quite exposed; others at rest, but the majority were obtained by beating ling (*Erica vulgaris*).

Although taken on ling, both species will eat whinberry (*Vaccinium myrtillus*) quite as freely in confinement. On referring to my notes, I find my first captures were made on May 20th, viz., three *O. jiligrammaria* and sixteen *Larentia caesiata*. *Larentia didymata* larvæ were very numerous along with the above, and equally common, feeding on whinberry" (*Entom.*, ix., p. 159).—J. W. TUTT.

HABITS OF LARVA OF EUPITHECIA SUBCILIATA.—With regard to the habits of *Eupithecia subciliata*, the larvæ feed on maple bloom in May. On one occasion we beat ninety larvæ (on May 22nd). These pupated, and imagines appeared on July 18th, and following days. The next year we beat about 70 larvæ on May 16th, and on May 30th the following year I received another supply of larvæ feeding in maple blossom. They feed up rapidly, pupate in or near the surface of the soil or among the food-plant, and are very easy to rear.—F. NORGATE. *April*, 1896.

THE HYBERNATING STAGE OF TILIACEA (XANTHIA) CITRAGO.—I happen to have some ova of *T. citrago*, received from Mr. Harwood, of Colchester, last autumn. They have been of a leaden colour all the winter, and have recently got darker, and I have no doubt would hatch at once if put in a warm place, or where the sun could get at them. I have kept them under a glass cover in an outhouse, north exposure, and with access for plenty of air. I expect they will bore into the buds of the lime just as *Xanthia aurago* does with beech a few weeks later on—not that I mean to express any opinion as to alliance between the two species, but only that the habits are probably similar as to wintering and emergence.—W. S. RIDING, M.D., F.E.S., Buckereil Lodge, Honiton, Devon. *April*, 1896.

EGG-LAYING OF PACHNOBIA LEUCOGRAPHA.—I found *Pachnobia leucographa* very shy of laying. Mr. Dutton and I have hit off the initial stage by placing small bunches of thread ends, suspended or coiled up in the box or cover where the females have been kept. On the thread they have laid a nice lot of ova. I noticed this peculiarity with *P. rubricosa* first. Any bits of torn muslin or stray thread ends were utilised, but the flat surfaces never. Tæniocampids deposit readily in the usual way, except *T. gracilis*, which is about the most stubborn I have yet tried to get eggs from.—S. WALKER, 23, Portland Street, York. *April 23rd*, 1896.

CANNIBALISM OF CALLIMORPHA HERA.—Of ten caterpillars of *Callimorpha hera* received last autumn as soon as hatched, all did well until the cold weather came. I then got a root of dandelion and put into a pot, placed the larvæ on the plant, and covered the whole with muslin. About a week since I looked at them, and could find only one, and that had grown and done well. Are they cannibals?—W. J. CROSS, Ely. *April 20th*, 1896. [An excellent account of wintering the larva of this species, by Mr. Jäger, is to be found in *Ent. Rec.*, vol. ii., pp. 41-42, and an account of cannibalism among its larvæ in *Ent. Rec.*, vol. iv., p. 174.—Ed.].

HYBERNATING LARVÆ OF CALLIMORPHA HERA.—With a great amount of care, I have succeeded in getting my larvæ of *Callimorpha hera* through the winter, and they are now almost full-fed. —W. HEWETT, 12, Howard Street, York. *April 17th*, 1896.

PRACTICAL HINTS.

I used to paint my drawers with a mixture of oxide of zinc and milk, which acted very well. The former should be obtained without lumps, and in a fine powder. Grease does not penetrate this paint to any extent worth mentioning, the only objection being that the paper is more difficult to remove if re-papering is subsequently done. I think, however, that re-papering is much the better plan.

If I find mites in a drawer, I put a bit of sponge on the head of a pin with a few drops of chloroform, and let it remain some hours, then put naphthaline in the cells, and sometimes sprinkle it on the paper. I find that the smell will really kill mites in a few hours.

I should strongly advise Mr. Studd to experiment on a few duplicates with corrosive sublimate before soaking the insects in his collection. If there is any appreciable quantity, it will corrode the pins and produce a white efflorescence on the wings after a little while. I use it with a small paintbrush (one in a quill, not a metal tube) for removing mould, dissolved in spirits of wine, but so weak that when a little is evaporated on a piece of glass the white crystals are almost invisible. But I would not soak moths in it, nor in anything, unnecessarily.—N. M. RICHARDSON, B.A., F.E.S., Monte Video, near Weymouth. *April*, 1896.

Field work for May and early June.

By J. W. TUTT., F.E.S.

1.—Towards the end of May, search the trunks of aspen in the evening for paired imagines of *Lobophora halterata* (*hexapterata*).

2.—“Cannock Chase.—*Gastropacha ilicifolia*, May 17th, in repose, clinging to a dead sprig of heather, apparently but lately emerged from the pupa. From its great resemblance to a withered leaf it would not probably have caught my eye, had I not luckily knelt down within a few inches of it to pin a small Tortrix.”—W. S. Atkinson.—*Zoologist*, p. 3396 (1852).

3.—When rhododendrons are in bloom they should be worked systematically at dusk, for *Choerocampa porcellus*.

4.—During the early part of June and August the large brown blotches on the leaves of *Heracleum sphondylium* contain the mining larvæ of *Chauliodes chaerophyllellus*. After a week they feed externally (usually gregariously) but, on the underside of a leaf.

5.—The first week in June is the time for *Sesia sphegiformis*, which assembles freely. It occurs in considerable abundance in Tilgate Forest, Basingstoke, and was so abundant in a Welsh locality last year—Dolau Cothy, Carmarthenshire—that the larvæ destroyed almost all the alders growing there.

6.—Early in June, search the sallows and willows for spun-up chambers containing the green larva of *Cleoceris riminalis*. As soon as these disappear, examine the folded leaves towards the end of the twigs for larvæ of *Tethea retusa*.

7.—The larva of *Depressaria carduella* mines the leaves of *Unicus lanceolatus*, and other thistles, in June, moving freely from plant to plant.

8.—During the first week in June, beat elms for the larvæ of

Thecla w-album, which are then almost (or quite) full-fed. The larva of *Zephyrus quercus* is to be obtained at the same time by beating oak. The larvæ of *Cosmia affinis*, *Trichiura crataegi* and *Asteroscopus sphinx*, can usually be obtained at the same time.

9.—The almost barren terraces of limestone in South-western Galway and co. Clare produce *Zygæna minos* in immense numbers at the end of June. The pupæ are to be found attached to stones.

10.—In early June the imago of *Dianthoeccia cæcia* is to be obtained flying over the newly opened flowers of *Silene maritima*, whilst the larva is to be found a fortnight later feeding on the flowers of the same plant (and *S. inflata*?) in the coast districts bordering the Irish Sea.

11.—During the first fortnight of June the capsules of *Silene maritima* should be collected for larvæ of *Dianthoeccia conspersa*. Later in the month those of *Lychnis respertina* should be collected for *D. carpophaga*, and those of *Silene cucubalus* for *D. capsicola*. It is better to search by night than by day.*

12.—Blackthorn bushes (stunted ones are often most prolific) should be beaten in June for larvæ of *Zephyrus betulae*.

13.—In hunting for *Agrophila trabealis* in June, "a switch, for the purpose of brushing the herbage, is of great advantage; and in capturing the moth, the net should be quickly placed over it as soon as one can get within reach."—(F. Bond).

14.—In May the full-fed larva of *Batrachedra pinicolella* occupies a gallery on the surface of a twig of spruce (*Abies excelsa*). When full-fed it spins a slender, somewhat flattened cocoon, on the underside of the same or an adjoining twig.

15.—In May the larvæ of *Chauliodes insecurellus* feed on the leaves of *Thesium humifusum*. Those of the second brood feed on the leaves, flowers, and unripe seeds in July.

16.—The larvæ of *Butalis siccella* live in long silken galleries, composed of sand and silk interwoven, attached to half-buried stems of *Thymus serpyllum* and *Lotus corniculatus* in early May.

17.—In May and June, marshy places producing *Angelica sylvestris* and *Aegopodium podagraria*, should be visited for larvæ of *Chauliodes illigerellus*, which live in crumpled leaves. In August, the larvæ of the second brood eat round holes through the sheaths of the unexpanded umbels, and feed on the immature flowers within.

18.—The larvæ of *Butalis variella* are to be found about the middle of May, making long silken tubes of silk and sand, interwoven, and attached to half-buried twigs of *Calluna vulgaris* and *Erica cinerea*.

19.—"To find the larvæ of *Nudaria mundana*, note some wall of loose stones (a 'dry stone dyke') where the imago is abundant, and in May lift the upper stones and examine their undersides. The larvæ will be found feeding on a green confervoid growth that covers the stones."—(F. B. White).

20.—At the commencement of May, the side shoots of branches of Scotch fir trees should be searched for the light brown pupæ of *Retinia pinivora*.

21.—At the end of April, and during May, pick the rolled-up leaves of sallow. *Hypermeria angustana*, *Argyresthia pygmaella*, *Penthina capreana*, *Tortrix crataegana*, *Ptycholoma lechæana*, *Semasia populana*,

* 11.—Mr. Prout remarks of this note:—"Lychnis for *D. capsicola*, *Silene* for *D. carpophaga* and *D. cucubali*."

Gelechia populella, *Epunda riminalis*, *Orthosia lota*, and many other species will be bred. Quite a succession of species will be obtained if the leaves be gathered continuously for several weeks.

SOCIETIES.

THE CITY OF LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY. —April 7th, 1896.—Exhibits:—Mr. Nicholson: a batch of OVA OF *TAENIOCAMPA MINIOSA* laid on a dead oak-leaf, which they strongly resembled in general tint, having changed slightly in colour since deposition; they were sent by Dr. Chapman. Mr. J. A. Clark: a CURIOUSLY MARKED SPECIMEN OF *HYBERNIA MARGINARIA*, which resembled some of the rather suffused forms of *H. defoliaria*. Mr. Tremayne: LIVING LARVÆ of *Callimorpha dominula*, *Bombyx quercus*, *Odonestis potatoria* and *Arctia caia*, from Deal; he distributed some of the larvæ of *C. dominula*, which, he said, were excessively abundant near Kingsdown this year. He also showed a pupa, which he had found lying on the sand on the shore, not far from some bedstraw; Mr. Clark said it was *Choerocampa elenor*: but it was a small specimen. Mr. Fuller: a perfect SPECIMEN OF *AGROTIS SAUCIA*, which he had taken on sallow-bloom at Keston. A short discussion took place regarding the DIFFICULTY IN BREEDING *CALLIMORPHA DOMINULA*. Mr. Clark said that he had always been very successful so long as he fed the larvæ on non-succulent plants, like hawthorn, nettle, dead-nettle, etc.; but groundsel and similar juicy plants were invariably fatal. Mr. Tremayne mentioned a case in which nothing but cripples resulted; he thought this was due to the fact that all these pupæ had been removed from their cocoons.

April 21st, 1896.—Exhibits:—Mr. Nicholson: a PIECE OF SALLOW cut from the end of a branch about 5 feet in length, growing on a bush in Ongar Park Wood. The lower part of the branch was normal, but about 2 feet from the ground it gradually began to widen and flatten, until at the end it was about an inch and a-quarter in width, but only $\frac{3}{16}$ of an inch thick. The last four inches of the piece shown curved round till it almost formed a circle, and from the extreme end a normal twig had grown to a length of about 3 inches. The catkins and flower-buds were distributed in a roughly-spiral manner round the flattened portion throughout. Mr. Nicholson mentioned a similar instance of exactly parallel malformation in a piece of asparagus, exhibited by Mr. Battley at a meeting of the North London Natural History Society. No one was able to suggest a cause for this extraordinary freak, which, Mr. Riches said, was not infrequent in asparagus and some other plants. Mr. Tutt read the following:—

“NOTES ON *HYDRÆCIA LUCENS*.—I exhibit to-night, for Mr. J. Finlay, of Morpeth, a long series of *H. lucens*. Probably no Noctuid species are less known than those recognised as *H. nictitans*, *H. lucens* and *H. paludis*. Whether they be species or sub-species is not known. They are very easily to be distinguished by those who know all three forms. They may even occur on the same ground and maintain their marked distinctions, whilst *H. paludis*, at any rate, breeds true. It would appear that the collectors in the North of Britain get only *H. lucens*, whilst those in the south get only *H. nictitans*. The range of *H. paludis* has not yet been determined. It is the only form of the

group that occurs on certain parts of the south coast of England. It overlaps *H. nictitans* at Deal, and overlaps *H. lucens* at Warrington. Although at present I have no doubt that *H. paludis* is distinct, as species go, from *H. nictitans*, my knowledge of *H. lucens* in nature is not sufficient to lead me to hazard an opinion. It will be observed that in the specimens which Mr. Finlay sends for your inspection three forms occur, *viz.*, (1) with the reniform white; (2) with the reniform orange; (3) with the reniform red. It will further be observed that two of the specimens which are grouped with those having a white reniform have the latter slightly tinged with ochreous. In ground colour it will be observed some specimens are darker than others. It is remarkable in this respect, that whilst the ground colour of the specimens with white reniforms are partly bright red, partly dark (inclining to brown), with one pale (somewhat grey) specimen, all those with red stigmata are of a bright red ground-colour, only one specimen being somewhat darker. On the other hand, those with orange stigmata are without exception dark in ground colour. The small orbicular, too, which, in many of the specimens having a white reniform, is almost imperceptible, is most distinctly red or orange in those specimens which respectively have red or orange reniforms. The mottled character of all the specimens is, however, very noticeable."

"ABERRATIONS OF *AGROTIS TRITICI*.—I exhibit also two specimens of *A. tritici*, a species which is exceedingly rare at Morpeth. The first, captured on August 10th, 1895, is of the normal dark greyish-fuscous streaked form (*tritici*, L.). The second, captured on August 23rd, 1895, is a most uncertain-looking specimen, confusedly marked, and not at all unlike some *A. nigricans* in general appearance. This is the *ab. hortorum*, St."

Mr. Bate read the following:—NOTES ON *SELEXIA TETRALUNARIA* (ILLUSTRARIA). The insects exhibited to-night were bred from ova given me last year by Mr. Bacot, which were laid by union of two of his summer brood. He told me that the batch of eggs which produced the ova given to me were largely infertile, and this infertility was conspicuous in the present case; certainly not more than one-third of the batch given me hatching out. They fed up well on birch, and pupated between two leaves, drawn together with a few threads of silk. Although not so large as his spring brood, they are distinctly larger than his summer brood, and it is noticeable that, although not perhaps so widely different as in his insects, the females are distinctly darker than the males. I spoiled the condition of the bulk of my specimens in the endeavour to continue the breed, as it was not until I fortunately obtained a pair of insects, which emerged within twenty-four hours of each other, that I succeeded in obtaining fertile eggs. It looks, therefore, as if this was a necessary condition for copulation to take place. A brood of larvæ is now feeding up, and I trust to bring copious details of their life-history before the Society at an early date."

Mr. Bate then read the following:—"NOTES ON *SPILOSOMA MENICA*." The insects exhibited consist of two males and six females, bred from ova given me by Mr. May, of Tottenham, last year, and there is nothing peculiar about them. Out of a batch of thirty eggs, seventeen hatched, and after feeding rapidly on narrow-leaved plan-

tain (*Plantago lanceolata*), pupated on the ground, amongst dead leaves, spinning a loose *Spilosoma* cocoon; being kept indoors, they emerged in March, producing eight females and six males. Being unable to get them to pair, I obtained nothing but infertile eggs, and the race is therefore lost; the imagines were kept in a large glass-topped cardboard box. The females remained perfectly motionless for days together, but the males fluttered about for hours during the period of darkness and, although they often ran right over the females, they took no notice whatever of each other. Although the males battered themselves to pieces in twenty-four hours, the females were in fair condition after living a fortnight. I suggest that in nature the male searches for his mate."

Dr. Sequeira exhibited very DWARFED SPECIMENS of *Selenia tetralunaria*, *Enodia hyperanthus*, *Melanargia galatea*, *Aglaïs (Vanessa) urticae* and others; also four British specimens of *Euranessa antiopa*, with data of capture. Mr. Bate said he had been unable to induce *Spilosoma mendica* to pair in captivity, although he had sacrificed many specimens. Mr. Tutt said that this species would not pair in captivity, unless a current of fresh air were allowed to pass freely through the cage containing the moths. Messrs. Prout, Nicholson, and Riches exhibited series of *Melanippe fluctuata*. Mr. Prout's series illustrated the various forms mentioned by him in a paper, which he read, on that species.

THE NORTH LONDON NATURAL HISTORY SOCIETY held a meeting on Thursday, April 9th, 1896.—Exhibits:—Mr. R. W. Robbins: *Choerocampa elpenor*, bred from Cheshunt larva; Mr. L. J. Tremayne: ova of *Amphidasys strataria*. Mr. Jennings recorded two additions to the local list of Diptera, viz., *Gonia fuscata* (♀ netted from flowers of chickweed, by the side of the Chingford Road), *Echomyia (Sercillia) ursina*, from sallows near High Barnet. He had also found *Chelonia grossa* in limited numbers, and a smaller species which he believed to be *C. flaricornis*. Both these species are well known to mimic most perfectly the bees of the genus *Andrena*, and this mimicry renders them most difficult of detection. Mr. Jennings had also met with *Bombylius major*; but this was not yet fully out. Mr. R. W. Robbins mentioned that Mr. Woodward, in company with Mr. Lovis, had taken 150 *Panolis piniperda* at Oxshott, on Easter Monday. Mr. Rose had taken *Taeniocampa miniosa* in some numbers in Abbott's Wood, on Easter Monday. Mr. C. B. Smith, on behalf of Mr. R. James, recorded one specimen of *T. miniosa* on Epping Forest, this year. Mr. Bishop said he had taken one there seven or eight years ago. Mr. Battley recorded *T. miniosa* from Brentwood, where, in fact, he had taken all the specimens of the genus in one night, except *T. opima*. Mr. Nicholson had noticed that, though the sallows were over, the usual "sallow" insects were still in fine condition, except *T. munda*.

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY met on April 9th, when Mr. Tunaley exhibited a lantern for entomological purposes, designed to obviate the inconvenience and smell of oil. It was thought that it would be, when completed, a capital success. Mr. South exhibited a banded specimen of *Aglaïs (Vanessa) urticae*, taken alive in his house at Tooting, on March 22nd. Mr. Williams: a living specimen of *Bombylius media*. Mr. McArthur: a bred series of *Hypsipetes trifasciata*, from Hoy. They were of a rich

chestnut colour, and had been reared on heather. This was considered to be a most unusual food.

The Diptera of Guernsey.*

Mr. W. A. Luff has done much for the entomology of the Channel Islands. Almost all Orders seem to be passing under his notice, for we have already had the Lepidoptera and Hemiptera. He commends the study of the Diptera to entomologists in the following notes:—"There have been few Orders of insects so neglected as the Diptera; for although some of the species are very elegant and beautiful in the perfect state, still the great majority are small in size and sombre in colour, and do not attract beginners in the science, like such insects as butterflies and moths. The life histories of these insects, however, are so interesting and varied that a study of even a few species will repay the observer."

In his general remarks of the families he says:—"The (Estridæ, or Bot-flies, are parasitic on horses, sheep, and oxen. They are termed 'bots' in horses, 'maggot' in sheep, and 'warbles' in cows and oxen. The eggs of the Bot-fly are laid on the hair in those parts likely to be licked by the horse. The young larva readily adheres to the moist surface of the tongue, and is from thence conveyed into the stomach, where they feed. Mr. Bracey Clarke, one of the best observers of these insects, says they are not injurious; others, however, are of a contrary opinion.

"The 'maggot' in sheep has a still more wonderful history. Its eggs are laid in the nostrils of sheep; these, on becoming larvæ, penetrate into the frontal and maxillary sinuses and even the horns, and feed on the secretions. When full-grown the larvæ fall through the nostrils of the sheep to the ground, and there change into the pupa state. In about two months the perfect fly makes its appearance.

"The 'warble-fly' of the cow and oxen is far more formidable than either of those just described. Its eggs are laid on the sides and backs of these animals, and the larvæ resulting from them pierce through the hide, producing tumours as large as pigeons' eggs. The food of the larva appears to be the pus or matter surrounding it in the tumour in which it exists. Having attained its full size, it presses itself against the upper part of the tumour, and, by some unknown process, makes a hole in the hide about the size of a pea. Through this the larva wriggles itself and falls to the ground, where it soon becomes a pupa. After lying on the ground some weeks the perfect fly emerges. It is a large and handsomely-coloured species, but very difficult to obtain on account of the rapidity of its flight and the difficulty of breeding it, the larva dying on being removed from the animal on which it has fed."

One species which Mr. Luff has captured, *viz.*, *Hyelodesia carbo*, Schiner, is not recorded as British. Of the rarer species which Mr. Luff has met with—*Epitriptus cingulatus*, Fab., *Syrphus grossulariæ*, Mg., *Eumerus lunulatus*, Mg., and *Lucina fasciata* are especially worthy of notice. The revised nomenclature, suggested by Mr. Verrall, is adopted throughout.

* *The Diptera of Guernsey.* By W. A. Luff. Published by The Guernsey Society of Natural Science, 1895.

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The Blue Butterflies of a Kentish hillside.

By J. W. TUTT, F.E.S.

A tangled shaw runs up the chalk-hills from the road to the wood yonder. Too broad for a hedge, too narrow for a wood, a mystery of verdure, the haunt of charming insects, of beautiful flowers, of interesting things of fur and feather—that is a Kentish shaw.

The chalk-hills here are capped with the Tertiaries. At one time, we doubt not, they were covered with them, but the action of air, rain, frost and running water has stripped their sides almost bare, and deposited rich beds of soil in the valleys, whilst a deeper layer of clay and sand still covers the summits of the hill-ridges of the North Downs. On these are situated those Kentish woods which make one of the most charming pictures of English scenery. From the boundaries of Surrey, past Rochester and Canterbury, these chalk-hills stretch, until at last they fall with precipitous cliffs sheer into the sea, a few miles north and south of Dover.

The woods are all of mixed growth—yews, oak, beech, hazel, birch, pine and ash intermingle their varied foliage, whilst a thick undergrowth is festooned with wild roses, honeysuckle and clematis. Hawthorn, buckthorn, privet and hazel form the chief undergrowth of the shaws: and inlets, carpeted in spring with primroses, violets, blue-bells and anemones, run into the woods.

The first Blue butterfly appears with the blue-bells. What connection there is between *Cyaniris argiolus* and the blue-bells we do not know, but years ago our attention was called to the fact, and wherever there is a carpet of blue-bells, there, on a hot sunny morning, the Holly Blue will be observed flitting about. The second brood of this species is here exceedingly rare. Occasionally a specimen is to be seen in August or September flitting along the rides, or on the outskirts of the woods, but such appearances are very unusual.

With the last week in May, in ordinary years, *Polyommatus bel-largus*, *P. icarus* and *P. astrarche* appear, usually almost simultaneously, but whereas the first-named comes with a burst and remains on the wing for two or three weeks in succession, the last appears suddenly, remains pretty abundantly for a few days, and disappears as suddenly as it appeared. The appearance of *P. icarus* is, at this time, only the herald of a long, straggling brood, which lasts well on through June, often, indeed, until the earliest specimens of the second brood are well on towards maturity.

These species have their special likes, for whilst *P. astrarche* haunts the edges of the woods, keeping close company with *Callophrys rubi*, that now abounds on the hawthorn blossoms, or, after midday, around the beeches, *P. icarus* loves a rough, grassy spot, and *P. bellargus* haunts the steep, open hillside, clothed with the vetches and trefoils on which its larva feeds. These three species occur together again in August, when the flowers of the thyme and marjoram are often covered with the brilliant little creatures.

There is considerable difference between the females of the two broods of *P. bellargus*, those of the early brood being especially brightly tinted with the male coloration (=ab. *ceronius*). This occurs, to a certain extent, in both broods, but is much more frequent and more strongly developed in the females of the spring brood. Many marvellous aberrations have been captured here. At Queensdown Warren (Rainham Station, L.C.D.R.), Mr. Tyrer and Mr. Sabine have captured many remarkable specimens (*Ent. Rec.*, ii., p. 111), and there are miles of similar country all over the hills.

In July, *P. corydon* appears, but much less abundantly than its brilliant neighbour. Usually it occurs at a period quite intermediate between the appearances of the two broods of *P. bellargus*. But this is not always so. In cold summers, the appearance of *P. corydon* is often so much delayed that late specimens occur with the earliest individuals of the second brood of *P. bellargus*. This is particularly the case if we have a hot spring (which produces a very early first brood of the latter species), followed by cold weather in June and July, so as to delay the emergence of *P. corydon*. Under such circumstances, the later part of the only brood of *P. corydon* and the early specimens of the second brood of *P. bellargus* are to be seen flying together.

The great similarity of the larvæ of these species is accompanied by a parallel similarity of the females, which resemble each other very closely. Sometimes, and this is especially the case with *P. bellargus*, the females are sprinkled with blue scales, and then these correspond in tint with those of their respective males. When they are not thus sprinkled, the black ground colour, the cleaner fringes the more richly, orange-red spotted hind margins, and the less strongly spotted underside of *P. bellargus* appear to offer the chief marks of distinction. If there are any better ones, we should be pleased to hear of them.

These are not the only "Blues" that haunt the chalk-hills. Here and there a rough grassy bay runs for a short distance into the wood. From the middle to the end of June, these abound with *Cupido minima*, quietly flitting in the sun or resting on the grass culms at the close of the afternoon. The females of this little Blue are much darker than the males, which are often quite plentifully sprinkled with the pale blue scales.

Nomia des semiargus used to occur here. Nothing, however, has been seen of it for about a quarter of a century, but there must be hundreds of acres of suitable collecting ground on these hills, where the foot of an entomologist has rarely, if ever, trod. *Lycaena arion* was recorded by Lewin and Stephens as a Kentish insect, and, judged by its Continental haunts, many suitable spots still occur.

Yonder is a stretch of rough ground, covered with scabious, bramble, ragwort, sainfoin and numberless other chalk-loving plants

in tangled confusion. There, a charming race of *Plebeius aegon* lives. When we first captured specimens, we thought they were *P. argus*, and that we had added another species to the British list. But Mr. Nicholson, of Lewes, recognised them as *P. aegon*, in spite of their being so much finer and larger than any of the heath-grown specimens. We wonder who will add *P. argus* to the the British list; it is so like *P. aegon* that it can easily be overlooked by the smartest collector; it is so widely distributed and so abundant on the Continent, that it can hardly fail to exist here.

Lampides boetica has not been known to wander on the Kentish chalk hills, nor are their warm southern slopes yet known to hide *Erebus argiades*, but the woods produce *Therla w-album*, *Zephyrus betulae* and *Z. quercus*, and the slopes swarm with Skippers. The clover fields that run along between the hills and the river sometimes teem with *Colias hyale* and *C. edusa*, whilst the woodside in spring is never without *Gonepteryx rhamni*. In short, forty-six species of our British Rhopalocera are to be captured on these banks, and in the woods behind them, within a distance of five miles, and the number of moths is legion. Indeed, no day's enjoyment can be better obtained, no more delightful scenery met with, no more interesting specimens captured, than on the breezy downs, through which the Medway cuts in its course between Maidstone and Rochester.

The Mallophaga or Biting Lice.*

From the time of Eleazar Albin's *Natural History of English Insects*, 1720, the MALLOPHAGA have interested a long series of the most eminent entomologists, including Linné, De Geer, Fabricius, Schrank, Stephens, etc. The insects are very small, live externally parasitic on the bodies of birds and mammals, are wingless, have biting mouth-parts, and differ from true lice by not sucking the blood of their victims. The average length of these insects is somewhat less than one-tenth of an inch, and they feed on the epidermal products (feathers, hair, etc.) of their hosts.

As early as 1668, Redi mentioned one of these insects, now known as *Trinoton luridum*, as the "louse of the teal;" whilst another species, *Lipeurus baculus*, is mentioned as "*Pulex columbæ majoris*." In 1818, Nitzsch compiled a memoir† which presents the essential features of the classification of the group now used; but the monumental work‡ on the group is Giebel's monograph, although to the student, Piaget's work|| is the most valuable treatise, the uncoloured figures and descriptions being very good indeed.

The MALLOPHAGA have an incomplete metamorphosis. The eggs are glued to the barbs of the feathers of their hosts, and the

* *New Mallophaga: with special reference to a collection made from maritime birds of the Bay of Monterey, California.* By Vernon L. Kellogg. (16 pages and xv. plates. Published by The Leland Stanford Junior University, Palo Alto, California, 1896).

† "Die Familien und Gattungen der Thierinsekten als ein Prodrömus Naturgeschichte derselben."—*German's Magazin der Entomologie*, vol. iii, 1818.

‡ *Insecta Epizoa, die auf Säugethieren und Vögeln schwarzrotzenden Insekten, nach Chr. L. Nitzsch's Nachlass bearbeitet, mit xx. Tafeln, etc.* 1874. Leipzig.

|| *Les Pediculines Essai Monographique*, vol. i., Texte, vol. ii., Planches, 1880, Supplement, 1885, Leyden.

young insects resemble the parents in all essential characters, the absence or incompleteness of the abdominal markings being the chief point of difference; the chitinization of the plates makes the insects darker as they get older, but the number of moults is not yet known for any species.

The food of the MALLOPHAGA has formed the subject of considerable study, and it has been concluded that the conspicuous large, dark, pear-shaped blotch in the abdomen, found in a majority of individuals examined, is the crop and its contents, the latter composed of hair, feathers, epidermal scales, and not blood. The dark colour, of course, is most distinct directly after a full meal and later, after digestion, is wanting. Blood has occasionally been found in the crop; and Kellogg describes at length the peculiar habit of *Menopon titan* var. *linearis*, which is parasitic on the Californian Brown Pelican (*Pelecanus californicus*), and is found commonly clinging to the inner surface of the gular pouch. The clinging is accomplished by the use of the mandibles, which are inserted in the skin of the pouch, and the insects appear, when discovered, to be always firmly lodged. Some effective clinging is, of course, necessary to prevent them being carried away by the water taken into the mouth when feeding. In several instances Kellogg noticed that a small region surrounding the parasites was raw and bloody, but he is inclined to think that their food consisted of the epidermal scales of the inner wall of the pouch.

The abundance of certain species, like *Menopon pallidum*, on domestic poultry, causes much inconvenience to the hosts, owing to the irritation set up by the sharp-clawed feet of the parasites. On the death of the host, the parasites remaining on the body die, and Kellogg considers this is due to the loss of heat, since it cannot be due to lack of food. It appears remarkable that those species which infest swimming and diving birds are not furnished with special contrivances for their mode of life, but, living as they do at the roots of the feathers, where water never penetrates, such special contrivances are not necessary.

Although the *Mallophaga* rarely pass from the host's body, yet migration is accomplished in many species, without doubt. This may easily take place among gregarious birds and mammals, or amongst others at the breeding season. In the case of birds, gulls, etc., where different species live gregariously, parasites can pass from one species of bird to another, and hence the same species of insect may occasionally be parasitic on different birds.

But when the same insect is parasitic on two birds, which are respectively confined to the New and Old Worlds, explanation is difficult. Yet Kellogg mentions twenty-two different species which have been described as parasitic on purely Old World birds, and which he has found on other birds in the New World. Thus he has found *Nirmus signatus* and *N. pileus* on the American Avocet, although they were originally described from specimens taken on the European Avocet. The meeting of these two birds is practically impossible, and the only reasonable explanation is that the parasitic species have, in these instances, persisted unchanged from the common ancestor of the two allied bird-species, now so completely separated. As Kellogg points out in such cases—"the parasites have remained practically unaffected by the conditions which have produced the

difference between the birds; the temperature of the host's body, the feathers *as food*, all the conditions of the environment are essentially unchanged in their relation to the parasite." The parasitic species may thus remain unchanged, whilst the bird species may have become differentiated into a dozen specific forms, all with a common parasite. The possibility of this explanation being true is largely increased by the fact that there is no known case where the same species of parasite affects Old World and New World species of birds, which are widely separated phyletically.

The peculiar conditions relating to those species of MALLOPHAGA that live on hosts of non-gregarious habits must also be considered. It is possible that in birds of monogamous habits the parasite becomes almost entirely cut off from its own kind, and, for many years, in-and-in breeding alone takes place, the only possible chance of a cross being when a fresh selection of a mate occurs. This isolation will soon mark the race, and the conditions will prevent the production of any wide divergence in the same species. It will create a great number of small variations in the same species, but, at the same time, it will tend to preserve practically unchanged (except for these trivial specific variations) the specific homogeneity of the parasites, and hence Kellogg says that, whilst he can refer a score of species taken from American birds to species described from European or Asiatic birds, yet, in all these cases, there are slight but recognisable differences between the Old World and New World specimens.

Some birds have as many as six species of MALLOPHAGA parasitic on them, others have two or three, whilst in others a parasite is confined to a single species or genus. It happens very rarely, however, when more than one species of parasite is found on a bird, that the parasites belong to the same genus. Usually the parasites belong to widely different genera.

The position of the MALLOPHAGA among insects is still open to question. They have been included in HEMIPTERA, because the *Pediculidae* (or sucking lice) belonged there, and both are external parasitic insects on mammals and birds. Then they were removed to the PLATYPTERA in the neighbourhood of Termites, Psocids, Perlids and Embiids (and are even retained there now by Dr. Sharp), and more recently, *i.e.*, since the PLATYPTERA were broken up by Brauer, MALLOPHAGA have been created into a separate Order. Their specialisation—in the line of degradation—is such that it is difficult to relate them closely with any other insects.

For British students, we do not know whether any work later than Henry Denny's *Monographia Anoplurorum Britanniae* or *An Essay on the British Species of Parasitic Insects*, 1842, London, illustrated with coloured plates, has been published. Some good general remarks on the Order are to be found in the *The Cambridge Natural History*, vol. v., by Dr. Sharp, but he states that the development of the MALLOPHAGA "is very imperfectly known," so that a specialist at the Order is sure to break virgin soil. Dr. Sharp gives no generic or specific characteristics, and hence his chapter is of no use to the pure systematist.

We have been tempted to write the above: (1). Because an up-to-date monograph of the British (and European) MALLOPHAGA, with notes on habits, life-histories, etc., is very badly needed. (2). Because we have received for review a valuable work on the Order, by Mr.

Vernon L. Kellogg, which should be in the possession of every student of the Order, both for the excellence of the letter-press and the plates. As Mr. Kellogg's studies have led him to recognise twenty European species (out of about sixty examined) of this Order, as parasitic on American birds, so we have no doubt the study of Mr. Kellogg's newly-described species will speedily prove that some of them, at least, have an European range. We are not in a position to criticise the scientific portion of the author's work, but must thank him heartily for the interest and instruction the perusal of his book has afforded us.

Melanippe fluctuata.

By L. B. PROUT, F.E.S.

My object in bringing this paper before the City of London Entomological and Natural History Society this evening, is not to provide a complete account of the natural history of the species whose name appears in its title, nor to clear up any difficult question of closely-allied species, nor (*mirabile dictu*!) to prove that it is the unhappy possessor of a name which does not belong to it: but chiefly to discuss its variation, and endeavour to reduce to some measure of order the chaotic varietal nomenclature; in fact, if possible, to do for this species what Dr. Buckell did so admirably for *Coccygnympha typhon*, six months ago. Since, however, a mere dissertation on varietal nomenclature is not likely to prove very interesting to most of our members, however useful it may be for subsequent reference, I propose also to incorporate the few sketchy notes which I have at command on the life-history and geographical distribution of this common insect.

It is, as I have already hinted, quite a relief to come across a species amongst the GEOMETRIDES, whose specific name is established beyond all possibility of cavil, or of future alteration according to the rights of priority. In the very first year in which such names were given, 1758, Linnæus (*Syst. Nat.*, ed. x., p. 529) named it *fluctuata*, and his diagnosis runs, "*Phalaena, Geometra seticornis, alis cinerascens: anticis fasciis abbreviatis tribus fuscis.*" The authors of the "Accentuated List" are in doubt whether Linnæus derived the name from *fluctuare*, to undulate—"the pale parts of the wings being much undulated with fine ashy streaks; or *flutuare*, to fluctuate—from the variableness of the species." As a rule, Linnæus described from one or two specimens only, and knew little enough about the variableness of any species; hence one would be inclined to favour the former derivation, only that, unfortunately, his type is the non-undulated pale form: under the circumstances, therefore, I "give it up." Linnæus cited figures in three or four earlier works, and he may have inferred from these, either the variability of the insect or the undulated appearance of certain specimens. The type specimen in the Linnæan cabinet (a female, hence the "*seticornis*" and the name *fluctuata*, not *aria*) agrees with the diagnosis, being the pale form with dark basal patch, costal half only of central fascia, and small sub-apical costal blotch.

In common with many other of our British LARENTHÆ, *Melanippe fluctuata* has a very wide geographical range; probably, in fact,

nearly the whole of the Palearctic and Nearctic regions. Staudinger says that he has himself taken it from the North Cape to the Straits of Gibraltar; it is not rare in many parts of Central Asia, etc.; I have a specimen from Syria; and the North American form, which Guenée named *iduata*, is now considered to be only a slight variety of it, though Moeschler (*Verh. z.-b. Gesell. in Wien*, xxxiv., 303) questioned this identification.

There can, I think, be no doubt that *Melanippe fluctuata* is capable of producing some very extreme and very interesting varieties; but whether it is, in the ordinary sense, an unusually variable species seems to be a matter upon which there is some difference of opinion, arising, I take it, from the geographical situation, and other special circumstances, of the individual entomologist. That is to say, my researches have led me to conclude that the insect is liable, under normal conditions, to run into certain *grooves*, if I may so speak, and may so far abide in them in some localities that even an experienced entomologist may come to deny that it is particularly variable. Thus Guenée writes that, though it "varies without doubt," yet he considers its variability has been a good deal exaggerated. On the other hand, the Norwegian entomologist, Schöyen, writes (*Archiv for Mathematik og Naturvidenskab*, v., p. 194) that the specimens from Finmark vary more than those in the southern parts of the country, and his compatriot, Sparre Schneider (*Tromsø Museums Aarshefter*, xv., p. 75), goes so far as to say that one may occasionally come across specimens so aberrant that they are hardly to be recognised.

In this connection, the question is also suggested as to how far the species lends itself to the formation of definite local races, as distinguished from mere aberrations: and here again there is room for difference of opinion, according to the individual standpoint. Thus Mr. Adkin, dealing with the British Islands, has concluded that "it would be wrong to assume that the species had assumed any special form, other than the type, in any particular locality" (*Proc. S. Lond. Ent. Soc.*, 1894, p. 82), and I think that to a large extent most British entomologists will be disposed to agree with him; yet even in our islands there are some *tendencies* towards the formation of local races here and there, as, for instance (as Mr. Porritt informs me) for the Yorkshire specimens to run to the smoky forms; and Dr. F. B. White (*Scottish Naturalist*, iv., p. 173) considers that Scottish specimens are almost invariably melanochoic; though Mr. Horne, of Aberdeen, writes me that he cannot at all agree with this, both extremes occurring, and the dark forms being, indeed, rather the exception in his experience.

At any rate, when we take a wider survey of the species, we do appear to find local variation assuming a considerable degree of stability; Romanoff, in his *Memoires sur les Lépidoptères* (vol. ii., p. 131) says that all the specimens caught by him at Askhabad, as well also as the Trans-Caucasian examples, show constant differences from the European, and appear to form a local race: to this I shall allude again presently. Again, the variety from Syria, and the Neapolitan and the Sicilian form, all seem to show distinct characteristics: and one may reasonably imagine that the same is true of the American var. *iduata*, Gn., or Guenée would hardly have considered it a distinct species; but I have only seen one American specimen,

to my knowledge, and that is in such wretched condition that I can make nothing out of it.

From the very meagre information on the subject of heredity in this species which I yet have at command, the above statements concerning local variation do not appear surprising: I infer that, given tolerably stable conditions of environment, the characteristic markings of a form may be transmitted from generation to generation with a considerable degree of persistency, and hence that, in some districts, what may be termed the "variable strain" may easily be bred out of existence in course of time. I have myself only once bred *M. fluctuata* from the egg, and then the whole brood followed the normal parent form pretty closely; and I find from the *Entomologist's Record*, vol. iv., p. 283, that Dr. Buckell has had a similar experience. The case is also generally much the same in allied species, as, for example, *Melanippe sociata*, *Coremia designata*, etc., etc.; while, if one has the luck to get eggs from an abnormal female, a most interesting and variable brood is likely to result. I recently called attention in the *Entomologist's Record* to a case in point, as regards *M. sociata*; and Mr. Goldthwait has obtained some extreme vars. of *C. designata* by breeding from a narrow-banded female, and also a parallel series of *M. fluctuata*. My idea is, therefore, from these and many similar instances, that there are, except in a few extraordinarily aberrant species, constant strains running along side by side with the variable strains, and that the latter are not very likely under ordinary circumstances to assume any local fixity, but are, on the other hand, somewhat liable to become suppressed in time in certain regions. Staudinger's distinction between "var." and "ab." will be very useful in such species as this; for while all vars. may appear casually here and there as aberrations, yet there are certain aberrations which, as far as has yet been discovered, have nowhere become permanent varieties.

As regards the affinities of *M. fluctuata*, the less I say to-night, the less I shall probably have to retract by-and-by: for I neglected, on the only occasion when I bred it from the egg, to make any critical examination of the early stages. From what I recollect, I imagine it will turn out to be somewhat closer to *Coremia* than to the *sociata* group; possibly *M. montanata* will prove to be its nearest ally, but I rather think the larva has a good deal in common with *C. designata*.

The larva is a pretty general feeder on *Cruciferae*, etc. Those which I have occasionally come across in my garden have been found on species of *Tropaeolum*, and this seems to be a very general food-plant. There are at least two broods in the year, but, as with *Coremia ferrugata*, etc., emergences are sometimes very erratic. It is capable of going through its metamorphoses very rapidly: my brood of eggs was obtained on June 22nd, 1892, the larvæ hatched on June 28th, commenced going to earth about July 16th, and the first imago appeared on August 3rd; but I find that shorter periods will suffice at certain times of the year and under certain conditions. Mr. Fenn (*Ent. Rev.*, iii., 176) gives five days for the ova, July 4—9, 1874; and about Wiesbaden, according to Rössler, the larval period is fifteen days only. On the other hand, a few larvæ (about fourteen) found in my garden in September, 1890, behaved, in the pupal state, in

the eccentric manner which I find to be so frequent with *Coremia ferrugata*, Linn. (*unidentaria*, Haw.); the larvæ were nearly full grown, and soon pupated, but of course I cannot say how rapidly they had fed up. About Christmas they were brought in-doors to force, but none appeared until April, and then only two or three; in May they were again turned out into an out-house to take their chance, and a few more came out at intervals, one in mid-winter, 1891-2; another in March, 1892; and the last on May 1st, 1892, after some nineteen months in the pupal stage. These specimens came out much more variable than the 1892 batch, reared from ova.

I suspect that to these eccentric broods belong the specimens occasionally met with in mild weather in winter. I have one record for November, and Mr. Douglas A. Onslow (*Entom.*, xxiii., 136) records a specimen in his garden on Feb. 2nd, 1890. I should be interested to learn whether this species generally develops in the pupa before the winter; for, if so, occasional early emergences could easily be accounted for. I remember that the imagoes from the 1890 larvæ, or some at least of them, developed a very long time before emergence, and I am under the impression that some one has informed me that that is usual.

In spite, however, of these occasional eccentricities, I have no doubt that we are reasonably safe in speaking of *Melanippe fluctuata* as a double-brooded species; it is so regarded by all authors, and the dates of the two broods are usually fixed at about May and July or August respectively. It is, nevertheless, rather curious that I very rarely meet with a spring specimen in my garden, but that there is usually a sudden emergence of numerous fine fresh specimens at the very beginning of July. Is the second brood generally very much the commoner, and is it usual for that brood to be out quite so early? And whence come the not infrequent *June* specimens?

It has been suggested that the two broods have somewhat different facies, and Mr. Boden tells me that he has found this to be the case in his experience, having himself bred both broods.

The Large Copper Butterfly (*Chrysophanus dispar*).

By J. W. TUTT, F.E.S.

The Large Copper butterfly was first noticed as being a British species by Lewin, in his *Insects of Great Britain* (1793). Under the name of *hippotohœ*, he figures it on Pl. 40 of that work, and states that specimens were met with by a gentleman in Huntingdonshire, on a piece of moorland. The specimens were afterwards sent to Mr. Seymer, F.L.S., of Dorsetshire, who presented them to the late Dowager-Duchess of Portland.*

At the time that Lewin's work was published, Donovan was producing (in parts) *The Natural History of British Insects*. He also figured (Plate 117) the Large Copper under the name of *hippotohœ*, and it was not until Haworth published the *Lepidoptera Britannica*

* We wonder whether Mr. Davies can tell us whether these are included in the Catalogue of insects, sold with the Duchess of Portland's collection, that he has? Specimens of *C. virgaureæ* (two pairs) are included, *vide*, *Ent. Record*, vol. v., p. 126.—ED.

(1803), that the name *dispar* was applied to our British insect, which was described as "a new and very beautiful species." On the Continent, however, two other authors, Geyer (in his extension of Hübner's *Europ. Schmett.*, figs. 966-968), and Esper (Pl. 38, figs. 1-2) figured the British species under the name of *hippotoë*. Until this date all the authors who had called the British insect *hippotoë* had done so under the impression that the British insect was the *hippotoë* of Linné, which, however, is another species. Among other things, Donovan asserted that this butterfly had been taken in Scotland.

Returning to Haworth, we find that he informs us that "the butterfly in July frequents the marshes of Cambridgeshire in certain but undeterminable years," further, "that it is a new and very beautiful species, lately detected by himself and his very dear friends W. Skrimshire and F. Skrimshire, M.D., and formerly in Wales by the celebrated botanist, Hudson." He also adds that the species has not been taken in Scotland, as Donovan has affirmed from erroneous information. It would appear that the Messrs. Skrimshire first saw this butterfly near Ely, in 1797 or 1798, and that, knowing it was not a common one, they afterwards went with Haworth to capture it.

The Aberdeen locality for *dispar* appears to have been maintained by Samonelle, who (in 1819) gives the names of three Copper butterflies as inhabiting Britain, besides the Small Copper (*Chrysophanus phlocas*). These are :—(1). "*Lycaena dispar* (the Large Copper). *Papilio hippotoë* of Donovan. Inhabits the fens of Cambridgeshire, and has been observed near Aberdeen, in Scotland." (2). "*Lycaena chryseis* (Purple-edged Copper). Inhabits Europe : in Britain it is extremely rare." (3). "*Lycaena virgaurea* (Scarce Copper). Inhabits Europe : very local in Britain. It is found in some parts of Huntingdonshire."* There can be little doubt that *L. dispar* and *L. virgaurea*, as mentioned above, refer to the same species. The maintenance of the Aberdeen locality, first started by Donovan, is quite inexplicable in the face of Haworth's previous remarks.

Before leaving Haworth's own published remarks, it may be well to quote a letter of his on the subject to the Rev. W. T. Bree, who communicated it to London's *Natural History*, 1834. In this Haworth remarks :—"Some entomologists once made an excursion into the fens for the purpose of taking the beautiful *Lycaena dispar*, or Large Copper butterfly, which, it is well-known, frequents low marshy grounds. The Coppers were captured in great abundance. It so happened that the following winter proved to be a very wet one, and the entire tract of land where the Coppers had been found was completely inundated, and actually lay under water for a considerable time. The entomologists deemed that the flood would certainly destroy the Coppers, and that the race would become extinct in that part of the country. The next summer, however, the butterflies were found again on the very same spot, as plentifully as before. Subsequently the tract of land was submitted to the action of fire, and the whole surface burnt, with a view to agricultural improvement. After this operation, the Coppers were no longer met with in that particular locality."

Kirby and Spence (1826) make reference to this species, in their

* *Entomologists' Useful Compendium*, p. 241.

Introduction to Entomology, in the following sentence:—"Morasses also have their peculiar insects. In this kind of district, in the Isle of Ely, has been taken that scarce and beautiful butterfly, *Lycaena virgaureae*, by a Fellow of Trinity College, Cambridge," showing that even then the nomenclature, as in use among British lepidopterists, was somewhat mixed.

Mr. C. W. Dale asserts that, after the capture of the specimens mentioned as having been taken by Haworth and the Messrs. Skrimshire, "the next specimens were taken at Whittlesea Mere, by Thomas Speechly, an old boatman in my father's employ, in July, 1819, and subsequently by my father himself and the Messrs. Standish. It appears to have occurred in great plenty, as several hundreds were taken within the next ten years by the London collectors, who visited Whittlesea and Yaxley Meres during the month of July, for the sole purpose of obtaining specimens. In 1827, Mr. Haworth took fifty specimens in a single day in Bardolph Fen, Norfolk; a few also were taken at Benacre, in Suffolk."*

In 1828, Stephens wrote† of this species as follows:—"This splendid insect appears to be confined to the fenny counties of Cambridge and Huntingdon, with the neighbouring ones of Suffolk and Norfolk, unless the account of its capture in Wales by Hudson be admitted; but this may probably be the following species (*hippotoë*), which may, moreover, eventually prove synonymous with *L. dispar*. In the first two localities it appears to occur in great profusion, as several hundred specimens have been captured within these last ten years by the London collectors, who have visited Whittlesea and Yaxley Meres during the month of July, for the sole purpose of obtaining specimens of this insect, which is also stated to occur on the coast of Suffolk, at Benacre; but that locality may, however, belong to the next insect."

It is very dubious for which of the Coppers Stephens' *hippotoë* was meant. One would, on reading his comparison of it with *L. dispar*, be inclined to agree with him that it was an aberration of the latter. "the female of *hippotoë* differing from that of *L. dispar* in having the spots on the upper surface of the anterior wings smaller, and in having the entire disc of the posterior wings above dusky, clouded with deeper spots, and without the fulvous nervures; the under surface has fewer and smaller spots than *L. dispar*."

The general remarks that follow, however, tend to lead one to the conclusion that it was an imported Continental species (like those of *chryseis* and *virgaureae*, which Stephens also describes). Of the insect described under the name of *hippotoë*, Stephens writes:—"The inferior size of the above insect, as well as the differences in the number and size of the ocellated spots on the lower surface of the wings, and the colour of the upper surface of the inferior ones of the female, combined with the circumstance that, amongst several hundreds of *L. dispar* which have been taken at Whittlesea Mere, not one specimen occurred agreeing with the above definition, seem to point out the present insect as a different species. The male which I possess was in the late Mr. Beckwith's collection, and the female is

* *British Butterflies*, p. 47.

† *Illustrations of British Entomology*, vol. i., p. 82.

in that of Mr. Haworth, who informs me that he obtained it many years since from an old cabinet that was formed by a gentleman residing in Kent, and which contained scarcely any insect that was not the production of that county, thence called the 'Kentish Cabinet,' which renders it probable, as Mr. Haworth surmises, that the true locality of the insect is Kent." So little care was taken in those early days to separate British and Continental specimens, that one is driven to conclude that this must have been an importation. That either Stephens' or Haworth's specimen was a Kentish one, we do not for a moment believe. The description suggests that the species is indeed the *rutilus* form of *C. dispar*.

There is something to be said in favour of considering these to be really British specimens of the *rutilus* form, for Mr. G. Bethune-Baker states that this form was undoubtedly taken in Britain. He writes:—"I have known for many years that my father took both ordinary *C. dispar* and var. *rutilus* some time between 1825 and 1834. My father tells me he captured all his specimens (eight in number) himself, all of which are in my collection, viz., five ♂ and three ♀. One male is typical *rutilus*, another almost typical, but with slightly larger spots, whilst a third is midway between *dispar* and *rutilus*, the remaining two are true *dispar*. Of the females, one is fairly typical *rutilus*, another is on the upper side like the darker specimens occasionally taken on the Continent, viz., with larger spots on the upper wings, but the spots beneath are decidedly larger than any of my var. *rutilus*, whilst the third is true *dispar*" (*E.M.M.*, vol. xxviii., p. 190).

But the day of extinction was not very remote, for in 1847 or 1848, the last capture of this species in Britain was made by Mr. Stretton, who took five specimens in Holme Fen. Thenceforth, all references to British *C. dispar* are in the nature of reminiscences of what the insect was.

Many of these reminiscences are interesting. One of these was recently penned by that entomological Nestor, Mr. Sam. Stevens, now undoubtedly the Father of British entomologists. He writes, "I well remember, at the meeting of the British Association at Cambridge, in the year, I think 1844 or 1845, I was introduced by Mr. Vernon Wollaston, or Rev. Hamlet Clark, to a man of the name of Rawlinson, the "Pie-man," as he was called. He used to go out for gentlemen of the University, to collect for them in the Fens—plants, insects, and other objects of Natural History—in the summer time, but in the winter he sold pies. Rawlinson asked me if I wanted caterpillars of the Large Copper; I said I could do with a few. Two days afterwards he brought me a dozen; I told him six would be enough, which I purchased of him at the price he asked, sixpence each. I took them home and bred five fine and perfect specimens. At that time one could buy the butterfly, from Argent and other London dealers, at 1s. and 2s. each. If one could only have anticipated what has happened, I should certainly have taken the dozen caterpillars and laid in a large stock of butterflies, for a little fortune might be made out of them."*

Another reminiscence, which, written as it was by a professional collector ("old Harding," of Deal), has a pathetic interest, as it tends

* *Science Gossip*, 1895, p. 20.

to do away with the pleasant fiction, in the belief of which we have all made ourselves comfortable, that collectors had no direct hand in the extermination of this beautiful species, but that the untoward result was brought about by the drainage of their haunts. This, however, is what Harding has written:—"About forty years ago Mr. Benj. Standish (the grandfather) heard that *dispar*, as then called, had been seen in the Fens. . . . He got a painting of the butterfly, coloured by his father, and went down to the Fens and showed it to people there, but no one knew anything about it. Mr. Drake, at the 'Checkers,' told him that a man lodged there who worked in the Fens, cutting reeds, who was a most likely person to know. When the man returned from work Standish showed him the drawing and said, 'Do you know anything about a butterfly like this?' 'Yes,' said the man, 'I saw some to-day.' 'Well,' said Standish, 'what shall I give you to take me to the spot?' 'No,' said the man, 'I intend to take a lot up to London.' Standish then offered him five shillings to take him to the place, but the man would not divulge the locality, even for a promise of two shillings for each insect captured. The landlord, however, told Standish where the man worked, and he was successful in finding the place and took a fine lot of *P. hippothoë*. It soon got wind among the folks at the Fen that they were worth two shillings each in London, and two men came from Cambridge and secured a large quantity, which they took to London in boxes full and sold them at sixpence each. I went down about three years after and got some of the larvæ. They appeared to be very local, and most numerous where their food-plant—the water-dock—was most abundant. The larvæ were collected by all persons, young and old. I bought two dozen larvæ of an old woman for ninepence, from which I bred some fine specimens, and sold them at one shilling each. Mr. Cole, at Holme Fen, took a large quantity of them. His back-yard was quite close to their locality. The last time I was there Mr. Cole said he had not seen one for some years. There was the food-plant in plenty on the same spot but no larvæ. They had been too closely hunted for" (*Ent.*, xvi., p. 130). The facts that its food-plant existed "in plenty" long after the insect had gone and that "the larvæ had been too closely hunted for," speak volumes.

The records of more recent authors are, of course, all culled from the ancient publications. Even as late as 1857, Stainton gives two species of British Coppers, besides *Chrysophanus phloeus*. These are:—(1). "*Chrysophanus dispar* (Large Copper), and (2) *Chrysophanus chryseis* (the Purple-edged Copper)." Of *C. dispar* he writes:—"1". 7^m. Bright copper-red, with one or more black spots on each wing; hind margins black. U.-s.—H.-w., pale blue, with distinct black spots. vii.-viii. Larva green, with a darker dorsal stripe, and one paler stripe on each side (Freyer). On *Rumex hydrolapathum* (great waterdock) and *R. aquaticus*, vi. Formerly found at Whittlesea Mere and Yaxley."*

Stainton then quotes Mr. Bond as follows:—"You are quite right in supposing that I have had personal acquaintance with living *C. dispar*. I much fear that I shall never have the pleasure again, as I am quite sure they have disappeared from the Cambridge and Huntingdonshire fens. All I can tell you about their habits is this, that

* *Manual*, i., p. 55

they were very active and shy, and would only fly when the sun shone; they would always settle on a thistle when they could find one in bloom, flying off to attack any insect, no matter what, that might come anywhere near them; not always returning, but generally passing on to another place. It was very little use following them if you missed your first stroke with the net, as they went away like the wind, and seldom let you get a second chance: indeed, it was difficult to follow them, as keeping your eyes on them and the boggy places was rather a difficult job."

Newman (1871) adds a little. Among other things he says:—"Varieties of this species are not common; in those that have passed through my hands there has been a remarkable uniformity of colouring, but Mr. Dale informs me that he possesses a female almost entirely black." He then adds, "My acquaintance with the caterpillar and chrysalis was made very many years ago, in Mr. Doubleday's garden at Epping, where the very plant of *Rumex hydrolapathum*, on which the caterpillars fed, is still in existence." The present writer believes that he possesses, thanks to the great generosity of Dr. Chapman, one of the very last specimens that Mr. Doubleday bred on that plant.

Of the variability of the dates of appearance, Mr. Newman gives the following facts:—"CATERPILLARS appeared at beginning of June, 1841; July 24th, 1827. CHRYSALIDS on July 25th, 1827. BUTTERFLIES, June 25th, 1826; July 3rd-5th, 1833; July 19th, 1827; August, 1819; August 4th, 1821." These dates were obtained from Mr. J. C. Dale. Newman had quite given up the idea that this beautiful species occurred anywhere except in the counties of Cambridgeshire and Huntingdonshire. In the former county he says it was taken "in plenty at Whittlesea Mere (J. F. Stephens); not taken in Cambridgeshire since 1845 (Thomas Brown)." Of its occurrence in the latter county we read:—"Yaxley and Holm Fens. The latest capture, consisting of five specimens, was made by Stretton, in either 1847 or 1848; they were all purchased by Mr. Harrington. I was at Yaxley for several successive years after this, but never saw another specimen or heard of another being taken" (F. Bond). Newman does not give Norfolk and Suffolk, to which counties we have already referred as producing specimens, on the testimony of Stephens and Mr. C. W. Dale.

There is one little item in the history of *C. dispar* which we have not been able to fathom. This originates in a report of the meeting of the South London Entomological Society, held on March 9th, 1893, where we read that "a discussion arose as to the occurrence of *Polygonmatius dispar*, Haw., at Camberwell, fifty years ago, and Mr. Fenn and Mr. Tugwell, both recorded probable Kentish specimens previous to 1848."* I have already quoted what Stephens says of a species of large Copper, supposed to have been captured in Kent, long antecedent to the date of his work (1828), and which he described under the name of *hippotothoë*. The only other reference that I can find bearing on the subject is a paragraph, which is rather more detailed than Stephens' remarks, although evidently referring to the same specimens, by Mr. C. W. Dale, who writes:—"It (var. *rutilus*) has been recorded as British under the name of *hippotothoë*. Concerning this my father wrote in *London's Magazine* for 1834: 'Mr. Haworth told

me that they came out of an old cabinet called the 'Kentish Cabinet,' and were said to have been taken near Faversham. I had a male and a female from the late Mr. Latham, which were from Capt. Lindegren's cabinet, whence, probably, all the supposed British specimens came.'† This is all I can find relating to Kentish specimens of *Chrysophanus dispar*.

Some of the impossibilities relating to the records of the occurrence of this species may be mentioned. We have already stated that Donovan considered that specimens were taken in Scotland, whilst Haworth records it as having been taken formerly in Wales by the celebrated botanist, Hudson. Mr. J. B. Hodgkinson, of Preston, states in the *Entomologist's Weekly Intelligence*, vol. iv., p. 10 (1858), that he saw a specimen "in Cumberland," that he took "a very deliberate look at it and lost it after all." This set the ball rolling, for, in the same Mag., p. 131, Mr. W. Winter, of Ranworth, says: "This species has again appeared in the fens here; I saw four yesterday, but missed them all." This was on June 19th, 1858. One is recorded (*Entom.*, vol. vi., p. 221) as having been seen on Hackney Marshes. I doubt whether any one of these has a suspicion of probability in it.

For very many years it was fondly supposed that we had this fine species all to ourselves, as it was well known that Duponchel's (i., 13, 3-6) and Boisduval's (*Icones*, 10, 1-3) figures, described under Haworth's name, were from British specimens; but when Staudinger's *Catalog der Lepidop.*, etc., was published in 1871, it was found that, although *C. dispar* was confined to England, yet it was only a form of a species well distributed over the Continent. This latter was the *rutilus* of Werneburg (*Btr.*, i., p. 391), the *hippotoë*, of Hübner (figs. 352-4), Ochsenheimer (1, 2, 83), Godart (1, 9 sec. 5 10, sec. 3), and Freyer (127). It has been captured in "France, Germany, South-Eastern Europe (citr. Græca), Bithynia, Armenia and the Altai." Kirby also considers the type confined to England.

The var. *rutilus*, which occurs on the Continent of Europe, is diagnosed by Staudinger as being smaller, with smaller spots; but, as the British specimens of *dispar* vary greatly in size, and some are certainly not larger than large *rutilus*, some other distinction was necessary. This was provided by Mr. Howard Vaughan, who drew attention to the much broader hind marginal orange band on the underside of the hind-wings in British specimens of *C. dispar*, when compared with var. *rutilus*.

Lang says that all the Continental specimens which he has seen "belong to the var. *rutilus*, and are so distinct that there ought not to be any confusion between them and the true typical form once taken in England." He further adds: "The most distinctive feature of *rutilus*, however, is the narrowness of the orange band on the underside of the hind-wings, near the hind-margin. I have examined a great number of specimens of *rutilus*, and also of *dispar*, with the object of fixing upon some constant character by which they may be differentiated, and have never seen a specimen of *rutilus* with the hind-marginal band so broad and so well defined as it always appears in *dispar*. I am, therefore, inclined to look upon this character as diagnostic."‡

† *British Butterflies*, p. 46. ‡ *Rhopalocera Europæ*, p. 91.

This was all delightfully clear, and those who had invested their gold in British "Coppers" breathed freely again, for it had been just recently asserted that a form, quite undifferentiable from British *C. dispar*, had been found in the Pontine Marshes near Rome, and in Egypt, and it is well known—such are the peculiarities of rare (and even extinct) British species—that the occurrence of the same form abroad would at once be accompanied with a great increase in the number of *bona-fide* British specimens.

The latest disturbance, however, on the "Copper" horizon was started by Mr. Bethune-Baker, who asserts that he has specimens of var. *rutilus* of undoubted British origin, captured in the Fens years ago with the ordinary *dispar*. Of course, this is, from a scientific point of view, the most natural thing possible, for there is no doubt that all local forms of a species will occasionally turn up as chance aberrations in all localities where the species occurs under other variations. But it is unfortunate from the speculator's point of view, for now he cannot insist that the var. *rutilus*, which are occasionally offered for sale as British, are not in reality so. Two undoubted var. *rutilus* were offered for sale as British, in the auction rooms, and, we believe, purchased as such, on April 13th last. Mr. Baker's remarks are quoted *in extenso* in an earlier part of this paper.

There are still some hundreds of British *C. dispar* in existence, but every year lessens the number. Accident, and the falling of old cabinets into a neglected condition, are the two main causes of the reduced numbers. Hence the price of *C. dispar* will always be on the up-grade. When we commenced to collect, in 1871, no dealer's list priced the finest *C. dispar* at more than 15s., and anything over a pound for a good specimen was looked upon as exorbitant. Slowly and surely as the number of specimens has decreased, and the number of buyers has increased, the price has steadily advanced. It is in my mind that only one specimen has ever produced more than £7, this was at the sale of Mr. Tugwell's collection, when a specimen went for £7 7s., but many have come near it; whilst £5 5s. for a really fine male, and £5 10s. for a really fine female, can be looked upon as ordinary market prices. In the sale of the Burney collection, males touched £6 10s. and £5 15s., whilst females reached £6 10s., £6, and £5 15s. In the Fry collection, £6 15s., £6 6s., and £6 per specimen were reached; whilst a specimen in the Tugwell collection went for £6, and a female variety of *C. dispar* in the Howard Vaughan collection for £6 10s. High as these prices are, they are nothing to what may be expected in the not very distant future, when "Coppers" may produce figures more nearly approaching the prices that have been given for Great Ank's eggs.

To anyone who can see the humorous side of things there is much to be amused at when the sale of *C. dispar* is on. There is the professional, who will give a couple of guineas for any specimen, in the poorest condition, if perfect; but who will not look at the most brilliant example if it has an antenna missing. He knows his market, and he never buys the latter. Then there is the keen amateur, who bides his time, watches the sale of the less important collections, and tells you he has a series of 10 or 12 specimens, for which he has not paid more than £2 or £3 each, and which are quite as fine and perfect as specimens which, in better known and better

advertised collections, produce about £5. Then there is the wealthy collector, who must have the specimen, and simply runs all opposition off its legs. It may be urged that this is derogatory to science, and that we should not descend to these particulars. We can only reply that this is the only method left now by which one can collect British *C. dispar*.

NOTES ON COLLECTING, &c.

HYBERNATING *PLUSIA BRACTEA* LARVÆ.—I had 106 larvæ of *P. bractea*, which went into hibernation about September 20th, 1895, when I removed them to a muslin bag. This was not disturbed during the winter (except on moving here from Enniskillen, last November, when the bag was packed into a tin, to travel). On opening the bag, on February 15th, there were only five larvæ alive, and these I placed on groundsel, growing in a pot. One died on March 25th, and the four survivors are now full-fed. One commenced to spin (April 10th) on the muslin cover of the pot. I should add that since February 15th the larvæ have been kept in a room in which there has been a fire during the afternoon and evening, and so are somewhat forced. Should I have the luck to get ova again, I should certainly try to force the larvæ from the first.—(Capt.) E. W. BROWN, Royal Barracks, Dublin, April, 1896.

SPRING NOTES.—Hybernated larvæ have been very plentiful this spring, after the mild winter. The Holly Blue (*Gyaniris argiobus*) has been unusually abundant. The spring brood is generally very rare, the second brood being the more numerous.—J. MASON, Clevedon Court Lodge, Somerset. May, 1896. [This is exactly contrary to our usual experience in Kent, where the second brood is always very rare.—ED.].

The winter has been so unusually mild, that many larvæ supposed to hibernate have, in my boxes, been feeding slowly all the winter. In the open, also, many larvæ, such as *Arctia villica*, *Spilosoma fuliginosa*, are much more abundant than usual, and very forward.—C. W. WILLIAMS, Penarth. May, 1896.

I paid my first visit to the river-wall on Easter Monday, and found on the sea-wormwood cases of *Coleophora maritimella* and larvæ of *Phorodesma smaragdaria*. The cases of *C. maritimella* are studded with small particles of grit, like those of *C. laripennella*. The larvæ of *P. smaragdaria* were almost naked, and have not yet (April 13th) shown any disposition to assume their spring attire.—F. G. WHITTLE, 3, Marine Avenue, Southend. April, 1896.

BUTTERFLIES! BUTTERFLIES!—I never expected again to see here so many butterflies on the wing as have lately appeared. For many years I have not seen butterflies so plentifully as I fancy I used to do; but for the past month butterflies have really been plentiful. All common species, no doubt. Hybernated *Aglais urticae* have never been in such force. *Gyaniris argiobus* used to be seen two or three a day, this year two or three could be taken at one sweep of the net. *E. cardamines* is abundant, not to speak of *Pieris rapae* and *P. napi*. I have not yet seen *P. brassicae*. *Pararge megera* abounds. *Vanessa io*, *P. egeria*, *Chrysophanus phlocas*, *Coccyonympha pamphilus*, *Polyommata c-album* have also put in an appearance. All this at my own door,

where a butterfly of any sort is a rarity in not a few seasons.—T. A. CHAPMAN, M.D., F.E.S., Firkbank, Hereford. *May 12th, 1896.*

SALLOWING.—The earliest *Taniocampids* were in plenty at fallow bloom by March 25th, but the species that turn out later—*Taniocampa gracilis* and *Pachnobia leucographa*—were at their best about April 6th. The evening of April 4th was one of the best nights at the “sallows” I have ever had. At Bishop’s Wood (Cawood, nr. Selby) with my friend, Mr. Dutton, we adopted the plan of cutting branches of the best bloom from the inaccessible parts of the wood, and hanging them up on the branches of trees in the rides. On each of these moths swarmed, and we had an umbrella literally covered after each shake. *T. populeti* was in the majority, and included the reddish form, which I had not previously met with. I boxed two fine female *T. opima*, a species which I had not previously taken at Bishop’s Wood, a series of *T. gracilis*, and a few *P. leucographa* in the best possible condition, and evidently just out.—S. WALKER, 23, Portland Street, York. *May, 1896.*

SYNIA MUSCULOSA AS A BRITISH INSECT.—I am much amused at “John Bull,” in the last number of your magazine (vol. viii., No. 1) making enquiry about the above insect, as to its being a British species. Between 1850 and 1855 at least 15 specimens, to my certain knowledge, were taken at and near Brighton. Mr. Henning, a hard-working collector in those days, and a most reliable man, took 7 or 8; 2 of these I have now in my collection. Mr. Tidy, also a collector, took several. Dr. Winter, who still resides at Brighton, took 2 or 3, if I remember rightly, at the lamps, at Royal Sussex Hospital, he being house surgeon at the time; his collection has since passed into the hands of Mr. Boyd. Others were obtained by Dr. Allchin, and other collectors at the time residing at Brighton. In those days the dealers, and those who sold their insects, were more honest, and did not attempt to introduce foreign specimens. I am sorry to say some of them of late years have not been so particular.—SAMUEL STEVENS, F.E.S., F.L.S., “Loanda,” 61, Beulah Hill, Upper Norwood. *May 6th, 1896.*

Thanks to the Editor, I am able to reply to Mr. S. Stevens’ note at once. I am much obliged for his courteous remarks relating to my question (*Ent. Rec.*, vii., p. 317), but data of the kind given are not exactly what I require. What I want to know is, whether there is a living lepidopterist who can honestly say that he has captured at large (wild) a living specimen of *S. musculosa* in Britain. I have no doubt, from the number of specimens (probably not less than four or five hundred) scattered throughout British collections, that the possessors of such believe them all to be the *bona fide* captures of “hard-working collectors.” That I do not believe they are, simply exhibits a difference of opinion between these gentlemen and myself. I am, however, open to conviction, and should be most interested if a “hard-working collector” would exhibit a living specimen of this species, caught in Britain, at a meeting of one of the London Entomological Societies. Does Mr. Stevens think that the Salvages would go to Scotland with *S. musculosa* at their back doors? The delightful way in which professional men particularly—lawyers and clerics as well as doctors—have enjoyed being gulled in matters entomological by unlearned collectors has long been a source of amusement to me.

As for the last paragraph of Mr. Stevens' note, I dissent entirely, and affirm, from a close perusal of our old British authors, that recognised professional collectors (who advertise their trade) were never so honest as now. We know so much more of our fauna, that a careless lie can usually be nailed to the counter at once; to wit, the *Tephrona cineraria* fraud of a few years ago. It is well known that a professional collector actually brought about the *exposé* of that fraud by showing the reputed locality to be impossible for the species. It is not that the old dealers were more honest, rather that it was much less easy to detect fraud.—JOHN BULL.

“REFLECTIONS AND QUERIES ON THE VALUE OF RARE BRITISH LEPIDOPTERA.”—Had your correspondent, “John Bull,” studied the *Ent. Annual*, to which serial he refers in his note under the above heading (*Ent. Rec.*, vii., pp. 316-8), he would have had no need to ask “the real ground upon which *D. ramburialis* and *E. catalunna* are considered British.” The capture, by himself, of a specimen of the former, at Probus, in Cornwall, on June 16th, 1858, is recorded by Mr. Thomas Boyd in *Ent. Wk. Int.*, iv., 1858, and again referred to in *Ent. Ann.*, 1859, p. 149, a coloured figure of the species being given on the plate in that volume; whilst the latter is introduced as British by Mr. Stainton, in *Ent. Mo. Mag.*, iv., 152, on the strength of a specimen taken at Cheshunt by Mr. W. C. Boyd, on September 18th, 1867, the capture being again noticed in *Ent. Ann.*, 1868, pp. 108-9, and the species figured on the accompanying plate. It is, perhaps, hardly necessary to add that the names of Mr. W. C. Boyd and his cousin are more than sufficient guarantee for the genuineness of these captures. Both species have been taken in Britain more recently,* but are of extremely rare occurrence. In his *British Pyralides* (1886), Mr. J. H. Leech gives “Lewes, Folkestone, Dover, Cornwall,” as localities for *D. ramburialis*, and Portland must be added, for one was taken there by the Rev. C. R. Digby, on July 11th, 1889 (*Ent. Mo. Mag.*, xxv., 381); while for *E. catalunna* Mr. Leech gives “near London, near Dover.” It may interest “J. B.” to know that “Warren’s collection,” which he quotes in connection with *Mecyna polygonalis*, has, I believe, throughout the catalogue of the Fry sale, no reference to Mr. W. Warren, but is an error for “Waring’s collection,” referring to Mr. S. Waring, whose name on some, at any rate, of the M.S. labels in Mr. Fry’s drawers was wrongly spelt “Warring.” “J. B.” says of *Hadena peregrina* that he believes “there are two known British specimens which Bond had”: he seems to be unaware of the existence of the *Ent. Mo. Mag.* (as he writes from London, it must be easily accessible to him in public or private libraries), in which, only last January (vol. xxxii., 19-20), Mr. McLachlan drew attention to the fact that he has a specimen taken by himself at Freshwater, in the Isle of Wight, on August 23rd, 1859, and recorded in the “*Zoologist*” for 1859, p. 6734, and also in the *Ent. Ann.*, 1860, p. 140. Mr. Sydney Webb could tell us whether Mr. Bond had more than the one specimen alluded to in *Ent. Ann.*, 1859, p. 147, and perhaps a search might disclose other records. “J. B.” asks why Mr. T. Salvage has never recorded the specimen of *Ophiodes lunaris* that he took on Brighton racecourse. Probably for the same

* Will our correspondent give exact references and captors’ names, please, leaving out Mr. Digby’s capture?—ED.

reason that he has never recorded the other rare insects that he has captured, and if he can get as good a price for them, in any case, one cannot wonder at his not troubling to publish notes on them, although one regrets that so many hard-working and reliable collectors, both professional and amateur, neglect to give us the benefit of their experience.—A COUNTRY COUSIN. *April*, 1896.

BREEDING BREPPOS PARTHENIAS.—I should be very glad if someone would give me advice as to the best method of rearing *B. parthenias* from larvæ. I have often tried to rear them, but they have invariably died.—L. S. BRADY, 17, Fife Street, Sheffield.

ABUNDANCE OF LARVÆ OF *APAMEA OPHIOGRAMMA*.—Will you be kind enough to tell me if the enclosed are larvæ of *A. ophiogramma*? I took them where I generally find the imago, but there are so many, though difficult to find, that I fear they are not that species; although, according to the books I have, they should be. Do they pupate in the stems or on the ground? Will they thrive on the cut grass? There is no way of sleeving them where I find them.—W. B. THORNHILL, Castle Cosey, Castle Bellingham, Ireland. *May 2nd*, 1896. [We submitted the larvæ, after exhibiting them at the meeting of the Entomological Society of London, to the Rev. C. R. N. Burrows, and append his reply.—ED.]

I believe the larva to be that of *A. ophiogramma*. It is the same as I am now finding in swarms on the striped grass here. The distinguishing mark seems to be the character of the plates on the anus, which look like another head. With regard to the queries:—(1). The larvæ pupate in the ground. (2) I expect they would thrive on cut pieces of grass stem, replaced daily, allowing moss, etc., to hide in, and earth to pupate in. My grass is absolutely demolished. —(Rev.) C. R. N. BURROWS, Rainham Vicarage, Essex. *May 9th*, 1896.

TORTRIX VIBURNIANA.—Last summer a friend of mine sent me some crumpled leaves of *Rubus chamaemorus*, from the top of Pendle Hill, near Clitheroe. This is the highest mountain in Lancashire. Three females and one male emerged. The female is very difficult to get, although the species swarms on all our mosses. Some of the forms we obtain are exceedingly fine.—J. B. HODGKINSON, F.E.S., Rosebery House, Powis Road, Ashton-on-Ribble. *May*, 1896.

ELACHISTA CINGILLELLA IN LANCASHIRE.—Reverting to the note (*Ent. Rev.*, vol. vii., p. 259) on this species, I may say that I have two specimens that I captured about ten years ago, at Grange-over-Sands. They were named for me by Stainton.—*IBID.*

PRactical HINTS.

Field Work for June.

By J. W. TUTT, F.E.S.

1.—In early June the unexpanded flower-buds of the common mallow are tenanted by a very small white larva, which produces *Gelechia rilella*.

2.—In the middle of June the larva of *Nannodia eppelsheimi* makes conspicuous white blotches in the leaves of *Silene nutans*. This insect is still waiting to be added to the British fauna.

3.—About June 10th is the best average date for *Banksia argentula*, when it abounds in Chippenham Fen.

4.—In June, shaking marram grass, which hangs over a bank on coast sand hills, often gives a supply of *Leucania littoralis* and *Manestra albicollis*. In July and August, *Agrotis tritici*, *A. cursoria* and *Actebia praeceox* may be obtained in the same way.

5.—The rare *Botys repandalis* is reported as having been bred from larvae found feeding in June, in the heads and young shoots of *Verbascum nigrum*, on the south coast of Devon.

6.—In May and early June the larvæ of *Elachista scirpi* makes short broad mines in the upper half of the leaves of *Scirpus maritimus*.

7.—The imago of *Phycis carbonariella* prefers to rest on burnt places on heaths.

8.—The blossoms of fir (*Pinus sylvestris*) should be collected in early June for larvæ and pupæ of *Sericoris bifasciana* and *Retinia sylvestrana*.

9.—In June, the larvæ of the first brood of *Chauliodes chaerophyll-tellus* are to be found on *Heracleum sphondylium* and *Pastinaca sativa*, feeding on the under surface of the large lower leaves beneath a slight web, and pupating among rubbish on the ground. The second brood feeds similarly in September.

10.—The green larva of *Tortrix lafauryana* is to be found in June, making an upright tube of joined leaves on the top of a shoot of *Myrica gale*.

11.—Early in June the wych-elm should be beaten for larvæ of *Mellinia* (*Xanthia gilvago*).

12.—“The collector should regard the net as useful only when it directs him to the locality of an insect, and gives a clue to the discovery of the larva; and if he should discard it for an entire season, possibly on looking over the year's work during the inaction of winter, he would find his cabinet certainly no poorer, and his mind replenished with an amount of information no mere collecting can afford” (Threlfall).

13.—The larvæ of *Pyralis glaucinalis* have been found during May and June in the nest-like bunches of twigs, which may often be observed growing at the ends of branches on birch trees.

14.—To find the larvæ of the *Scopariæ*, “peel off the moss growing on the north side of shady rocks, large boulders and walls, in spring and early summer, and examine the underside of it. If larvæ be there, the galleries of silk slightly span upon the moss and the grass will indicate their presence. To rear them, place the tufts of moss in a jam-pot with ground top, and cover with a piece of glass” (F. B. White).

15.—In June, plants of *Sedum telephium* are often much covered with the webs of the larvæ of *Hyponomeuta vigintipunctatus*. The larvæ of the second brood are still more abundant in August.

16.—The first week in June is the best time for *D. caesia*, and the second week for *D. barrettii*.

17.—In the middle of June, the barren dunes near Yarmouth should be searched for the long cocoons (placed perpendicularly in the sand) of *Crambus fascinelus*. They may be found just beneath the sand where the grass *Triticum junceum* is growing. Cocoons are often exposed by the wind.

18.—The Ordnance Survey Maps (Stanford, Charing Cross)—Nos. lxiv., lxxi., lxxii., and lxxix., are those required by those who work the Lyndhurst (New Forest) district.

19.—*Boarmia roboraria* is best taken at rest in the early morning, but it comes to sugar late at night.

20.—Larvæ of *Tethea subtusa* are to be found "in pockets at the edges of the leaves of poplar, made in an almost identically similar manner to those formed by the young larvæ of *Tiliacca citrago*" (B. A. Bower). Please compare with *ante*, p. 20.

REVIEWS AND NOTICES OF BOOKS.

THE GRASS AND GRAIN JOINT-WORM FLIES AND THEIR ALLIES, by L. O. Howard. [Published at the Government Printing Office, Washington].—In his "Letter of Transmittal," Professor Howard says that this is the "second number of the technical series of bulletins, intended especially for working entomologists, and to be distributed also to learned societies, and to periodicals and libraries." It is to be hoped that the Entomological Societies of the British Islands will endeavour to get a copy, for this pamphlet deals most fully with the phytophagæ *EURYTOMÆ*, mainly from the classificatory standpoint, although many interesting notes as to habits, etc., are appended. The dimorphism and alternation of generations of *Isosoma tritici* and *I. grande* were established some ten years ago by Professor Riley, but many new observations and facts have accumulated since that time, and it is these that Professor Howard has so skilfully brought together. Figures of many new and old species are given.

Obituary.

JOHN A. COOPER. Died April 19th. 1896, aged 47 years.

It is with the greatest regret that we have to inform our readers of the unexpected and almost sudden death of Mr. J. A. Cooper, at the age of 47. As late as Good Friday last he was in his usual health, but a day or two after he took cold, and influenza set in during Easter week. Pneumonia supervened towards the end of the following week: he grew rapidly worse, and the illness terminated fatally on Sunday the 19th. The funeral took place on April 23rd, at Ilford Cemetery, when several of his entomological friends were present. He lost his wife some four years ago, and leaves two sons and a daughter between the ages of 17 and 21.

Of his entomological work there is little to be said. He was not a scientific man in the true sense of the word, but a lover of nature, passionately fond of out-door life, an ardent collector of birds as well as insects, an accurate observer and pleasant companion. Of recent years he has been more deeply interested in the collection, and study of the variation, of birds' eggs than lepidoptera, although he usually found time to get a few *Erastria renustula*, and other specially local species every year. His collection of Lepidoptera is not a large one, but the specimens are in excellent condition, and faultlessly set. He was, until recently, a member of both the City of London and South London Entomological Societies, although of late years he has not attended the meetings of either with any degree of regularity. He was a liberal supporter of the private funds by which the South London Entomological Society is enabled to print its Proceedings.

SOCIETIES.

SOUTH LONDON ENTOMOLOGICAL SOCIETY.—April 23rd, 1896, Mr. C. A. Briggs exhibited a male SPECIMEN OF *STYLOPS MELITTLE*, taken at Leatherhead on April 18th, 1896. Messrs. Barrett and Turner: series of *Tryphaena orbona* (*comes*) from various localities. Mr. Adkin: his very long and varied series of the same species from many localities in the British Islands, and also specimens from Asia Minor and Europe. He then read a paper entitled, FURTHER NOTES ON *TRYPHENA COMES* WITH SPECIAL REFERENCE TO VAR. *CURTISHI*. After referring to his previous paper on the subject, Mr. Adkin gave an account of the geographical distribution of this species, stating that its eastern boundary extended into Asia, but was ill-defined, whilst to the south it included North Africa, and to the west was bounded by the Atlantic sea-board. Its northern boundary was remarkably constant, for, so far as it has been recorded, it was bounded by the parallel of 59° N. lat. in Russia, Denmark, Sweden and the Orkneys, whilst the species was absent from Norway and the Shetlands. The species is, on the continent, only slightly variable. In Asia Minor the specimens are of an uniform clay colour, and the insect only develops the special melanic forms towards its north-western boundaries. It becomes red in its more western localities, whilst in the Scilly Isles it is peculiarly marked with strongly developed scalloped transverse lines. He considered that southern Europe was the original home of the species. He pointed out that Mr. Merrifield had suggested that the darkening of some lepidoptera was due to the influence of low temperatures, and he was inclined to think that the darkening of *T. orbona* was due to a somewhat similar cause, as it only occurred in the most north-westerly part of its range where the temperature was low. Mr. Adkin found that the larva, which hibernated during the middle of winter in nature, under the influence of a higher temperature, in confinement, continued to feed all the winter. Mr. Barrett called attention to the way in which the waved line mentioned by Mr. Adkin was formed, *viz.*, by the union of the elbowed line with a series of dots which ran parallel to it. Mr. Tutt said that the formation of this line had been well explained by the Rev. Mr. Burrows in his recent article "On *Calamia lutos*a and its variation," and that it was of very general occurrence in various Noctuid families. He considered that Mr. Adkin was entirely wrong in attributing the cause of the melanism of *Tryphaena orbona* to cold, for Dr. Buchanan White and Mr. Norman had repeatedly pointed out that the districts haunted by this particular form, *viz.*, Forres, Sutherland, &c., were among the mildest in the British Islands, and that many species which were quite missing in the north of England and southern Scotland re-occurred again in these districts. *Macaria notata* was a well-known instance. He looked upon the variation as due to protective resemblance. He further remarked that Mr. Adkin still retained the name of *T. comes*, first used erroneously in this country in *The Entomologist Synonymic List*, but he had shown (*Brit. Noct. and their Varieties*, vol. ii.) that the old nomenclature, as generally used in Britain—*viz.*, *T. orbona*, Hufn., for the common species, and *T. subsequa*, Hb., for the rarer one, was correct. Mr. Barrett doubted whether the coloration was protective as the imago of *T. orbona* rested under leaves. He was

also inclined to allow that moisture had some influence in causing melanism in this species. Mr. McArthur whose experience with dark forms of this species is, perhaps, unequalled, said that he considered the dark colour was protective. In the places it haunted it could not hide beneath green leaves, as suggested by Mr. Barrett, but it rested on the dark peat, where it was marvellously well protected.* Mr. Adkin, in reply, touched on three points. He did not agree with Mr. Tutt that the dark coloration was protective, although he considered it was an advantage to the species [What this means we do not quite understand.—Ed.]. He had looked into the matter of the name of the species, and did not know that anything had been published which had been generally accepted as to the change of the insect's name from *comes*. He, therefore, did not see the necessity for altering the name. He knew that Dr. Buchanan White had said that Moray and parts of Sutherland were very mild, but yet there was *something* peculiar about the atmosphere, for fallows were some six weeks later there than in the South of England.

A meeting of the CAMBRIDGE ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY was held on May 1st. Mr. Brown, F.E.S., exhibited some interesting specimens from Australia, including a mimetic insect, *Tenodora aridifolia*, and some of the remarkable structures made by the "basket-worms," or caterpillars of the *Psychidae*, some of which were formed from portions of leaves woven into a sort of cocoon, while another was a structure of considerable strength formed by fastening together pieces of twigs cut by the insects to suitable lengths, also some cocoons of *Cimber* upon twigs of the whitethorn, found near Cambridge. Mr. Paton (Queens') exhibited a specimen, believed to be a hermaphrodite of *Spilosoma lubricipeda*. The President (Dr. Sharp) read a paper, illustrated by diagrams, on THE STRUCTURE AND DEVELOPMENT OF THE LEPIDOPTEROUS WING. He said that an Italian observer had recently found rudiments of wings in the caterpillar of the silk worm, three or four days before it was hatched from the egg. From this early stage he traced the development, mentioning how Gonin believes that the wing becomes an external organ, the growth and fate of the tracheae and the origin and structure of the nervures of the wing of the perfect insect.

THE NORTH LONDON NATURAL HISTORY SOCIETY held a meeting on Thursday, April 23rd, 1896.—Exhibits:—Mr. Prout: specimens of *Anticlea badiata*, bred from Epping Forest larvæ, also larvæ of *Orthosia suspecta*, from Wimbledon ova. Referring to the nomenclature of the Bee Hawk Moths, he said that, as this Society was at present bound by South's list, we ought to call the two species by precisely the opposite names to those which Newman used. That is to say, the broad-bordered species was *bombylififormis*, the narrow-bordered, *fuciformis*. Mr. Battley had seen the first specimens of *Pieris rapæ* at Enfield, on April 18th. Mr. R. W. Robbins made some remarks on the forwardness of the season, which was about two or three weeks earlier than last year. Mr. Harvey remarked that "Sallowing" in Epping Forest on Saturday last (April 18th), had been almost a failure, though he had taken a few specimens of *Pachnobia rubricosa*, *Taeniocampa gracilis*, *T. munda* and *T. instabilis*.

* Mr. McArthur's full remarks form the subject-matter of a separate article, *vide*, *ante*, p. 34.

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MIMICRY.

III.—UTILITY AS THE PREDOMINANT FACTOR IN DEVELOPING MIMETIC PATTERNS.

By J. W. TUTT, F.E.S.

In our preceding remarks (*ante*, pp. 31-33) we have attempted to show by what process of reasoning Weismann has reached the conclusion that utility is the mainspring in producing the particular forms of protective coloration and mimetic patterns that we so frequently observe, and we find ourselves agreeing with him that utility does show us why these have been evolved each in its special direction.

We now find Weismann asserting that the "supposed formative laws are not obligatory," and that "dispensations from them can be issued and are issued whenever utility requires it." Weismann has previously stated that, in his opinion, "the laws involved" in giving rise to the markings are "the physiological conditions of the variation," and that "the laws come into consideration only to the extent of conditioning the quality of the constructive materials—the variations, out of which selection fashions the designs in question."

His assertion, therefore, is so startling that it may be well to consider how he justifies it. He states that "these transgressions of the law extend so far, that, in the very midst of the diurnal butterflies, is found a genus, the South American *Ageronia*, which, like the nocturnal butterfly, shows on the entire upper surface of both wings a pronounced bark-coloration, and concerning which we also know (and in this respect it is an isolated genus, and differs from almost all other diurnal butterflies), that it spreads out its wings when at rest like the nocturnal butterfly, and does not close them above it as its relatives do."

From this illustration Weismann concludes that "the facts here cited are alone sufficient to remove all doubt that not inner necessities or so-called formative laws have painted the surface of butterflies' wings, but that the conditions of life have wielded the brush."

We fail here to follow Weismann's reasoning, or to see how his conclusion at all follows from the principles that he has enunciated. We can understand very well from the illustration that he gives, that selection has brought about a certain useful result very satisfactorily, but that the result has been arrived at independently of the laws which he himself lays down (and which we quote in the second

paragraph of this article), or has been *caused* by the external environment to which it responds, is quite another matter. We prefer to consider the response to environment simply as the outward expression of certain variable factors which must first arise, it seems to us (and to Weismann also it would appear from other parts of his paper), within the organism itself, and which are directed, as to what lines they shall ultimately take, by the external conditions of life, as Weismann intimates.

To support his conclusion, Weismann considers in detail the coloration of the exempt Heliconids, which have the same hues on the upper and lower surfaces of the wings, and he suggests that it might be said that "the coloration of the Heliconids runs through from the upper to the under surface," and that, possibly, one might suppose that the coloration was "the expression of a law." But, he argues, "among numerous imitators of the Heliconids is the genus *Protoyonius*, which has the coloration of the Heliconids on its upper surface, but on its lower exhibits a magnificent leaf-design. During flight it appears to be a Heliconid, and at rest a leaf. How is it possible that two such totally different types of coloration should be combined in a single species, if any sort of *inner* rigorous necessity existed, regulating the coloration of the two wing-surfaces?"

Surely Professor Weismann has shown us himself how the evolution of two such dissimilar wing surfaces could arise from internal forces. It is easy to show that during the process of histogenesis in the pupa, the scales are built up, and Weismann himself has shown us that the original determinants of the scales must be equally subject to variation as those of the other organs, and equally independent of each other; and, also, that the determinants of the scales on the lower surface of the wing are quite separate from, independent of, and vary differently from, those on the upper surface, and can, therefore, be developed on entirely different lines. It is easy to understand, then, how two different colours (or patterns) can be developed on the upper and lower surfaces of the wing respectively.

We only state this to show that the Professor rather overplays his part, and underestimates, to some extent, what internal forces can do. Although, then, we disagree with this detail, we quite agree with his conclusions, and believe that the direction which these will take is determined by utility. It will be seen from this that we are not among those who deny the efficacy of selection. Nor do we agree with those who think the directive force which determines the character of these markings has its origin within. What we do disagree with is the too generalised assumption of the total inefficacy of internal forces, and the implied suggestion that the external factor—utility—is sufficient to originate, and not merely to direct.

Returning to the *Protoyonius*, the Professor continues:—"Now, although we are unable to prove that the *Protoyonius* species would have perished unless they possessed this duplex coloration, yet it would be nothing less than intellectual blindness to deny that the butterflies in question are effectually protected, both at rest and during flight, and that *their colorations are adaptive*." With this we quite agree; so also we do with the Professor's position that, "although we do not know

their primitive history, we should hardly go astray if we assume that the ancestors of the *Protophonus* species were forest-butterflies, and already possessed an under surface resembling a leaf. By this device, they were protected when at rest. Afterwards, when this protection was no longer sufficient, they acquired, on their upper surface, the coloration of the exempt species, with which they most harmonised in abode, habits of life, and outward appearance."

But when we have granted all this, when we have agreed that this is, as Weismann avers, sufficient to "explain why these butterflies did not acquire the coloration of the Heliconids on the under surface;" when we have further agreed with him that "the reason is, that in the attitude of repose, they are already protected, and that in an admirable manner," we appear to have got no further as to how the duplex coloration originates, and we would suggest that our previous explanation, *viz.*, the independence of the scale-determinants of the wing, is quite sufficient to explain how the differences originally came about, natural selection having determined the respective directions which the two surfaces should take.

Weismann probably would answer that he does not question this view, that he is only asserting that utility explains "why," and not "how." He repeatedly asserts, however, that selection and utility originate the colour-patterns, which is true in a general (and only in a general) sense, so far as actual patterns do not exist as such until natural selection forms them out of the crude material at its disposal. Nor do we agree with those who, Weismann says, assert that "the colour patterns of the butterfly's wings have originated from internal causes independently of selection," for we believe that there are at least two processes of selection engaged before the ultimate production of any colour pattern:—(1). Selection (internal) among the biophors themselves, before the crude material is ready prepared, as it were, for the action of (2) natural selection (external), to mould it into some particular pattern.

The explanation offered by Weismann as to why exempt (nauseous) diurnal butterflies should be coloured alike on the upper and under surfaces, and should never resemble, in the attitude of repose, their ordinary surroundings, appears sound. It is that "it is a much greater protection to be despised when discovered, than to be well, or very well, but never absolutely, protected from discovery."

Weismann holds that the implications of the apparently trivial and commonplace statement that "butterflies are protectively coloured on the under surface, militate against the inner motive and formative forces which are ever and anon appealed to." We were inclined at first to disagree with this, on the ground that internal forces were responsible for the variations which natural selection has utilised in order to build up the pattern which has rendered the butterfly protectively coloured. This, however, hardly seems to be the point raised, and we agree that the actual protective pattern has been produced by external and not by internal forces.

On this subject, Weismann goes on to say:—"No less than sixty-two genera are counted to-day in the family of diurnal butterflies known as the NYMPHALIDÆ. Of these, by far the larger majority are sympathetically coloured underneath, that is, they show in the posture of rest the colourings of their usual environment." He then

shows that this sympathetic coloration is extended in some species to the tips of the fore-wings beneath, in others, the whole of the underside of the fore-wing is sympathetically coloured, the area of the wing thus coloured being coincident with the part visible in the attitude of repose. The Professor then asks:—"Where are the formative laws in such cases?"

In the sense that internal forces alone could give rise to this sympathetic coloration, we would re-echo the Professor's question. We do not believe that any formative laws originate the actual patterns from within, in the way the question so distinctly suggests. We would answer with the Professor that formative laws of this kind do not exist. The scale determinants are subject to the same physiological laws as those of other organs. They are guided in the course of their development by various considerations, and there appears to be no doubt that, whilst the general development of these is due to internal forces, the exact peculiarities that they shall assume are determined by natural selection.

The learned Professor is most anxious to point out that when the sympathetic coloration spreads over any portion of the underside of the fore-wing, it is due to the development neither of new, nor of more, scales than are present on the covered portions of the wing in the same species. It is simply due to the wing being exposed, and he asserts that "the scales are just as dense on the covered as on the uncovered surface of the wing, and, in many species, for example, in *Katagamma*, the scales of the covered surface are coloured most brilliantly of all."

We have now seen how internal variations and internal forces give rise only to general results, that the detailed fashioning of these variations into definite paths, so as to produce tints and patterns which shall be of service to the species, is brought about by selection, and that selection is guided in its action by utility, *i.e.*, that although selection chooses the particular variable factors for the purpose of building up the required patterns, it selects only those which are useful for the preservation of the species.

The Tephrosia Tangle.

By LOUIS B. PROUT, F.E.S.

It is now fully two years since my interest was awakened in the synonymic intricacies of the "*Tephrosia* question," through certain passages which caught my eye in turning over the pages of Borkhausen, the accredited sponsor of the name of *biundularia* (*vide*, South's *Syn. List*, or Stgr's. *Cat.*); of which passages, more anon. I gradually got together—at fitful intervals between my other studies—the more important early Continental literature on the question, and had recently decided to publish a note on *Tephrosia crepuscularia* and *T. biundularia* (so-called) at an early date; in fact, by a curious coincidence, I had just returned from the British Museum, where I had been supplementing my Continental notes with studies of our early British authors, when, taking up the *E.M.M.* for February, I was confronted with Mr. Briggs' interesting note (p. 36) on the self-same British authors. Mr. Barrett, in following the same question back amongst the original nomenclators, quotes entirely from matter which I have

had in hand for eighteen months past (excepting his citation from Illiger, which he attributes to the "authors" of the *Vienna Catalogue*), and I only regret that I had not gone far enough to save him the trouble and delay of six months in connection with his researches.

Mr. Briggs' results, as regards our British authors, seem to be incontrovertible, except that he has made out that the July insect is the second brood of the May (and June) species, which all breeders, or careful observers of localities, etc., will admit is most certainly erroneous. But, as Mr. Briggs points out, we must go back to the German authors in order to establish the correct synonymy. Now, I venture to suggest that Mr. Barrett, while he has brought forward much that is important, has nevertheless left things in somewhat of a tangle, has not given us any clue as to the months of appearance, etc., of Borkhausen's *biundularia*, and has not shown us by what name we may know the "larch-frequenting early yellower species." It is well known that Mr. Barrett has long been firmly convinced that the two insects are not specifically distinct (*vide*, *E.M.M.*, xxiii., p. 85), and, therefore, these matters are not important from his point of view; but many close observers have held, and do hold, a very different opinion. I have, therefore, taken in hand to work out the nomenclature very fully in the following notes.

I should recommend all who are interested in the subject to refresh their memories of the "*Tephrosia* controversy" in the *Entomologist* for 1886 (vol. xix.). As that is so readily accessible, I shall not quote from it, but will merely state that we have two species or sub-species to deal with:—No. 1.—Double-brooded, first brood generally brown, March and April; second brood generally grey, July. No. 2.—Single-brooded, white or whitish, May and June.

No. 1 is the "*crepuscularia*" of writers in the *Entomologist*, and of Doubleday's *Second Catalogue*; and I fancy most of us so understand South's *List*, though Mr. Briggs interprets it otherwise. No. 2 is the "*biundularia*" of the same authorities. The latter alone occurs in Epping Forest, or at least in the southern parts thereof, and is most certainly single-brooded, notwithstanding the southerly locality. My friend, Mr. A. F. Bayne, who knows the Forest well, *once* took a crippled female in *November*, but it is needless to say that that is entirely abnormal.

Throughout this note the two forms shall be distinguished as "No. 1" and No. 2," and I propose to insert those numbers in parenthesis wherever they can possibly assist to elucidate my meaning to those readers who may care to wade with me through the intricacies of the subject. I therefore reiterate that No. 1 is the *early double-brooded* insect, No. 2 the *pale* species of *May and June*.

Similaria, Hfn. [1767], must certainly be rejected as doubtful. It is generally cited to *crepuscularia* or *biundularia*, but Werneburg is confident that it is = *luridata*, Bork., "whitish yellow, with brown bands, and many dots of the same; on oaks. 2nd size; June and July; rare," will not assist us very much. Nor does Rottemburg [1777] add much further light, though he calls the colour "dirty white, yellowish dusted," and hence I cannot help thinking we really have *T. crepuscularia* or *T. biundularia* (or both) in the question, rather than *T. luridata*.

Crepuscularia, W.V. [1776], is a mere catalogue name, and has been effectually disposed of by Mr. Barrett.

Bistortata, Goetze [1781], has been ignored, since the name was "quite unfittingly chosen," being in fact due to the assumption that the insect was identical with a bistort-feeding species in Reaumur. But inasmuch as many of Linné's names of like origin have been accepted (e.g., *Emmelesia alchemillata*, *Yponomeuta eronymellus*), its rejection is quite illogical. Goetze merely names a figure of De Geer's (*Mémoires*, Tom. 2, Pt. 1, pl. 8, fig. 16), quotes his diagnosis, and does not even cite Reaumur. Hence it is clear that, if we can identify De Geer's species, it will have to be called *bistortata*, Goetze, just as his figure of the "Streamer" moth is now called *nigrofasciaria*, Goetze. De Villers subsequently [1789] names the same figure *biundulata*; this latter name, therefore, sinks as a synonym, and the question is again encountered with which synonymists have so often to deal—Would *biundularia*, Bork., or *biundularia*, Esp., be valid in the face of this rejection? But, fortunately, I believe *biundularia*, Bork., to be identical with *bistortata*, Goetze.

De Geer's important figure dates from 1771. He found the caterpillar feeding on alder, and it was full-fed on August 4th; he kept the pupa in a warm room, and the imago, a female, emerged on January 1st. He described it as being dirty white, marked with grey, and as being almost of the colour represented in his figure (an uncoloured one). As the grey dusting is somewhat sparse, Mr. Barrett suggests that the insect represented is our *biundularia* (No. 2); but on investigation this does not appear to be the case. I cannot entirely match the figure by any British specimen known to me; but it probably comes nearest to a pale Perth example (No. 1, *crepuscularia*) in Mr. Tutt's collection. By an interesting, though not important coincidence, Mr. Tutt also has a bred specimen which emerged on January 1st; I have not heard of *T. biundularia* (No. 2) emerging so early, even under artificial conditions.

In order to obtain further light, however, I consulted my esteemed correspondent, Professor Aurivillius, as to the form actually occurring in his neighbourhood (Stockholm), and he has very kindly sent me two examples. He writes:—"This species is rather scarce in Sweden, and we have not many in the museum, but all which I have seen are of the same pale colour; the dark form has not been found in Sweden. I think you are right in referring De Geer's figure to the form I am sending you. In De Geer's collection of types, which is in our museum, his species, however, is represented by a specimen of *Cidaria respertaria*, Bork., but this species agrees neither with the description nor with the figure." The specimens sent me are indisputably *crepuscularia* (No. 1), not the warm ochreous form which we get in England (var. *abietaria*, Haw., according to Guenée), but the common Continental form, only a shade lighter than the ordinary German specimens. In Sweden, the species normally appears in May and June, but so also do *Selenia bilunaria*, *Anticlea badiata*, etc., etc., while the whole genus *Tarniocampa* appears in April and May; so that there is no evidence in the dates to prevent our uniting the Swedish insect with our early species. In the entire absence of all evidence of the occurrence of our white insect in Scandinavia, I therefore unhesitatingly declare De Geer's figure to represent (as I had already believed from the appearance of the figure itself) our early species (No. 1); and the two names belonging to the figure, *bistortata*, Goetze, and *biundulata*, Vill., are to be referred here.

Proximaria, Fb. (*Ent. Syst.*, No. 66), is most probably synonymous with *bistortata*, Goetze, but, like *similaria*, Hfn., is an insufficiently described species. Werneburg determines it for "*crepuscularia*," and it would certainly be curious if Fabricius had not noticed this common species at all.

Borkhausen's *biundularia* [1794] is prior to Esper's, for the latter quotes the former. Mr. Barrett is no doubt right in concluding that Borkhausen knew both species under the one name, but he omits some evidence going to show that that author's ideas of the species were chiefly based on our so-called *crepuscularia* (= *bistortata*, Goetze = No. 1). "Whitish-grey, more or less thickly brown dusted" is not very definite, I admit, but I protest it is not quite fair to italicise the "whitish," as Mr. Barrett has done. All the available evidence goes to show that the *less* white species (No. 1), though not in the warm ochreous colouring of our South British specimens, is the common Continental form, and Guenée, who expressly distinguishes our May-June species (No. 2) from his type, yet describes the type as "dirty white, strongly powdered with reddish-brown." Further down, Borkhausen mentions the "very white" specimens as a variety. His species is double-brooded; the first brood appearing very early, contemporaneously with *Brephos parthenias* and *Asphalia flavicornis*, the second brood in June and July; June would be rather early for the second brood with us, but a little allowance may be made for latitude, etc., and Borkhausen obtained these specimens *by breeding from May larvae*, so that our single-brooded May-June species (*from previous season's larvae*) is not in the question.

Surely, then, the citation of *biundularia*, Bork., to Guenée's "var. B.—*biundularia*, Esp.," is erroneous, and *biundularia*, Bork., is to be regarded as synonymous with *bistortata*, Goetze (= No. 1).

Hübner's fig. 158 (*crepuscularia*) is, as Mr. Barrett says, the May-June species, though it is a trifle more strongly brown-dusted than some examples. As we have not yet found a name applicable to this species, we discover—as Mr. Briggs will be pleased to learn—that Stephens and Wood were quite right, and Doubleday's second catalogue wrong, and that this species (No. 2) is the true *T. crepuscularia*. Doubleday's second catalogue was based on Guenée; and the explanation of Guenée's separation of *crepuscularia*, Hb., from *biundularia*, Esp. (both really = No. 2) is that the latter is the more extreme form, and probably the examples in Guenée's collection belonged to that extreme form. Esper's plate 40 follows Hübner's fig. 158 chronologically; the exact date of both is uncertain, but as Esper cites Hübner's figure, the order of priority is beyond question. Esper's ♂ figure (Pl. 40, fig. 3), as I have just said, represents Guenée's idea of our Epping Forest species (No. 2), with but slight dark dusting, and strong black transverse lines and marginal dots. I am puzzled that Mr. Barrett has said, "his female figure is one upon which no one, I think, would like to pronounce." This figure (Pl. 40, fig. 4), though badly coloured, or a singular form, is far better than some of Esper's, and is of a decided brown colour, and most certainly the banded spring form of the double-brooded species (No. 1). Thus Esper, like nearly all Continental authors, unites the two species.

Duponchel's *crepuscularia* is certainly, both from his description and from his very satisfactory figures (Pl. 158, fig. 3), the browner,

double-brooded species, the ♂ weakly marked, the ♀ more strongly. His dates for the two broods agree well with Borkhausen's—end of March and end of June.

Freyer's figures (246, ♂ and ♀, *crepuscularia*) are badly done, and the ♂ has strongly pectinated antennae. I am not certain which species they represent. He says that he has always found his larvæ in autumn, and bred the moths in spring; he mentions that the insect varies between "quite pale, almost white-grey," and "inclining to dark brown." Later on (510-1) he figures, under the name of *defessaria*, one of the darker varieties with no prominent markings except the pale subterminal. He describes it as being "grey-brown" in colour; I should be inclined to call it a *dirty moss grey*, with pale *blue-grey* subterminal. Herr Bohatsch (*Wien. Ent. Zeit.*, iv., 176) refers to this aberration some *black* specimens received from England as "*biundularia*" (*i.e.*, of course, our extreme *delamercensis*, B.-White), and mentions the erroneous *blue* colouring of the white subterminal. There is no doubt that Bohatsch's determination is right in the main; but our melanic form is a more extreme development of the ab. *defessaria*, and deserves to retain Buchanan White's name of *delamercensis* (*Ent.*, x., 128). On the Continent this ab. *defessaria* is the only form recognised as "*biundularia*;" this can be seen from the Zeller collection, or from the following quotation from Steinert, of Dresden (*Iris*, vii., 322):—" *Crepuscularia*, Hb.—Common. Staudinger distinguishes in his collection three forms—the ordinary grey, the dark with white border-line, which he calls *biundularia*, and a third, quite pale-grey, almost white, to which he has given no special name. All three forms occur in our district. Two broods: March, April, July, August." Apparently they get the single-brooded species somewhat early (as in the North of England), but a few of Zeller's specimens were obtained in May and June. Dr. Staudinger must have overlooked Guenée's description of var. *biundularia* as a *whitish* insect. In fact, the synonymy, as given in Staudinger's *Catalogue*, is altogether a most remarkable jumble. The above quotation from Steinert shows that he regards the darkened *defessaria* form (with the extreme *delamercensis*), as "*biundularia*;" yet he cites here Esper's white figure (Pl. 40, fig. 3), and our ochreous brown British *abietaria*, Haw. (*laricaria*, Dbld.); while to his *pale* species, "*crepuscularia*, Hb.," he cites Duponchel's *brown* figures, and Freyer's unicolorous dark *defessaria*!

Mr. Briggs (*E. M. M.*, xxxii., 26) has so carefully worked out the descriptions of our older British authors, that I need not say much regarding them; his only error was in giving *consonaria*, Haw., and *strigularia*, Stph., as a variety of second brood of the May-June species (No. 2), thus repeating the error made by Doubleday in his 1850 edition; these names denote the pale second brood of *bistortata*, Goetze (No. 1), as can be readily seen from the very satisfactory descriptions and figures in Stephens (iii., 192) and Wood (figs. 518, 519).

Concerning other varietal names, I may mention that Thierry-Mieg has named the blackish-brown Welsh variety of *crepuscularia*, Auct. Brit. (No. 1), "*ab. passetii*," and the black variety of *biundularia*, Auct. Brit. (No. 2), "*ab. nigra*" (*Læ Naturaliste*, viii., 237). The date of these names is 1886, and the latter should probably sink

before *delamerensis*, B.-White (1877), or is at least only a slight sub-variety of it.

I have not discussed in this article the question of the specific identity or distinctness of these puzzling insects. Our great authority on differentiation by the genitalia, Mr. F. N. Pierce, finds no distinction whatever.* While my investigations were in progress, I heard from Mr. W. Hewett, of York, that he was trying to get together all the information available on this point: and he and I have arranged to give it what study we can during the present season. I append the full synonymic tabulation, based on the assumption made throughout, that there are two separate species (or, at least, sub-species, worthy of careful differentiation).

No. 1. BISTORTATA, Goetze, *Ent. Beitr.*, iii., 3, 438 (1781); De Geer, *Mémoires*, ii., pt. 1, pl. 8, fig. 16 (1771). *Biundulata*, Vill., *Linn. Ent.*, ii., 337 (1789). *Biundularia*, Bork., v. 65 (1794), *Esp.*, pl. 40, fig. 4. *Crepuscularia*, Dup., vii., pl. 158, fig. 3 (1829). *Gn.*, i, 264 (1857). *Dblld. Cat.*, ed. ii. (1859). ? *Similiaria*, Hfn., *Berl. Mag.*, iv., 512 (1769). ? *Proximaria*, Fb., *Ent. Syst.*, No. 66 (1794).

Var. Gen. 1. *Abietaria*, Haw., *Lep. Brit.*, p. 276 (1810), *Sph.*, iii., 191, *Wd.*, 517 = *laricaria*, *Dblld.*, *List*, 15 (1848) = *crepuscularia*, var. A., *abietaria*, *Gn.*, i., 264. Warmer, more ochreous brown than the Continental type.

Var. Gen. 2. (? *Crepuscularia*, Haw., *Lep. Brit.*) = *consonaria*, Haw., *Lep. Brit.*, p. 277; *Sph.*, iii, 192; *Wd.*, 518. *Strigularia*, *Sph.*, iii., 192. *Wd.*, 519. (N.B.—As aberrations, *consonaria*, *Sph.*, and *strigularia*, *Sph.*, may be separated, representing slightly different forms).

Ab. passetii, Thierry-Mieg, *Le Nat.*, viii., 236 (1886). Blackish brown.

No. 2. CREPUSCULARIA, Hb., 158, (*cir.*, 1797). *Biundularia*, *Esp.*, pl. 40, fig. 3, *ucc.* 4 (*cir.* 1797), *ucc.* Vill. *Crepuscularia*, *Steph.*, iii., 191 (1829), *Wd.* 517. ? *Crepuscularia*, *Frr.*, 246.

Ab. defessaria, *Frr.*, 510.1 (1847). Almost unicolorous grey, with whitish subterminal.

Ab. delamerensis, B. White, *Ent.*, x., 128 (1877). Smoky blackish.

Ab. nigra, Thierry-Mieg, *Le Nat.*, viii., 237 (1886). Entirely black, except the slender white sub-terminal. (N.B.—For purposes of merely rough classification, these three forms may be united, as they are only gradations along the same line).

* The examination was made on specimens determined by Mr. Prout.—ED.

A sign of the times. The over-collecting of British Butterflies.

Nothing shows more the advance of scientific opinions among lepidopterists than the remarkable discussion which took place at the meeting of the Entomological Society of London, on May 6th. There can be no doubt that, in the opinion of many lepidopterists, the man who simply collects is rapidly becoming a public nuisance, and it is pretty well understood that his exterminating processes act distinctly as a check to the scientific aspirations of entomologists.

The discussion showed that it was well recognised that collecting was necessary to obtain material for study; further, that large numbers

of men collect with no intention of study, but merely to make a collection, which can, at some future time, be converted into cash. This led up naturally to the assumption that the large money value of purely British insects was the real basis of the evil of over-collecting. If rare British insects had a value in agreement with that of Continental specimens of the same species, it was clear that the professional collector would become a general collector of material for scientific study, instead of the exterminator of comparatively rare or local species, to fill up gaps in collections, whilst the amateur-professional, knowing that his collection had only a general value, and that no particular species had an unreasonable intrinsic value, would cease to persecute such insects as, at present, have a high money value, to the verge of extinction.

Mr. McLachlan opened the discussion, and pointed out that *Chrysophanus dispar* and *Nomiades semiargus* had already undergone extinction, whilst *Lycaena arion*, formerly a somewhat widely distributed species, was slowly undergoing extermination at the hands of collectors. *Papilio machaon* would undoubtedly have long ago become extinct but for the inaccessibility of some of its haunts. He considered that the damage was almost entirely committed by amateur collectors, and thought that certain species should not be collected at all for some years. He stated that one of the objects he had in view in bringing this matter forward was to see whether some plan could not be devised to protect those narrowly localized species which were apparently in danger of being exterminated by over-collecting.

Mr. Goss instanced how *Melitaea cinxia* and *Lycaena arion* had largely been exterminated, the former in its Isle of Wight localities, the latter in Gloucestershire. He complained bitterly of the damage done to *L. arion*, last season, by Major Still and a North London collector. He would like to draw up a Bill to prevent all collectors capturing these species for a time. He further stated that *Papilio machaon*, although apparently doomed to extinction in its chief locality in Cambridgeshire (Wicken Fen), would probably linger on in the county in smaller fens, such as Chippenham, where the larvæ had been found feeding on *Angelica sylvestris*. It would certainly survive in the Norfolk Broads, both from the irreclaimable nature of the fens there, and the extensive range of the species in the district, which Mr. Goss said he had explored in 1887 in boats.

Professor Meldola knew little of British collecting, but thought that schoolboys should be led rather to make observations on the habits of the living insects, than to capture and kill them for no specific purpose whatever.

Capt. Elwes thought that legislation in this direction would be somewhat difficult. He did not think that schoolboys destroyed many species. He considered that the bad seasons, which had been so detrimental to farming, had also been injurious to insect life, and that many insects disappeared from meteorological causes.

Colonel Irby said that *L. arion* had disappeared many years ago, not only from Barnwell Wold, Northamptonshire, but from another part of the county on the estate of Lord Lilford, not accessible to the public, and that its disappearance there was no doubt caused by the destruction of the food-plant and other herbage by burning the pasture, and by the grazing of sheep.

Mr. Tutt thought that it was improbable that the average seasons were now any more injurious to insect life than they had been for the last few thousand years. The question divided itself into two parts. (1) Was there overcollecting? (2) If so, how could it best be stopped? In support of the first query he instanced *Apatura iris* and *Melitaea athalia*, which in the "seventies" abounded in Chattenden. He had seen as many as eight amateur and two professional collectors stationed at the top of the hill (around which every specimen of *A. iris* in the wood flew from about 11 a.m. to 3 p.m.), at a distance of about two or three yards from each other, practically fighting for each specimen as it came up. For about six or seven years, a dealer from Dartford, and another from Erith, practically lived on the ground from July 12th to August 10th, never missing a fine day during the time that the insect was out, their total captures decreasing from about 250 in 1880, to an odd specimen or two in 1888, since which time the species has been practically extinct. *Melitaea athalia*, being easier to catch, had fared even worse. One man, living at Soham, was practically responsible for all the damage done to *Papilio machaon*, at Wicken, the collectors of the village being too wise to kill the goose that lays the golden eggs. The extinction of the commonest butterflies in every wood within easy reach of London bore evidence to the fact that "over-collecting" did occur.

As to a remedy, Mr. Tutt thought legislation impracticable, and considered that, as the country was well covered by natural history societies, a committee should be formed to submit any information relating to over-collecting, of which it might become possessed, direct to the local association in whose district it occurred, with a request to the officers of such association to take steps to put a stop to the injury that was being done to the local fauna. He proposed a resolution that such a committee be appointed, which, being seconded by Capt. Elwes, was carried unanimously.

On the Ovum, Oviposition and Food-plants of *Callophrys* (*Thecla*) *rubi*.

By Colonel FREDERICK LE GRICE.

Callophrys (*Thecla*) *rubi* occurs pretty freely at the Warren, Folkestone, flying generally over the brambles which abound there, but not despising the elder, mealy guelder rose, whitethorn, and other bushes. It has long been a puzzle to me, and I fancy to many other Folkestone entomologists, as to what the food-plant of the larva is, or on what the ova are deposited, as none of the plants given in the text-books occur there. I have, however, within the last few days, much to my pleasure, satisfied myself on these points, and think it may interest others.

The sunshine of the last few days was, I thought, a favourable opportunity, so I determined to try and solve what was to me a mystery. The result of capturing a considerable number of *C. rubi* flying over brambles was not a single female, so I turned my attention to the grassy slopes in their neighbourhood, and after some time had the satisfaction of seeing a female evidently bent on oviposition. The plant she selected was the rock-rose (*Helianthemum vulgare*). The ova are green, about $\frac{3}{100}$ of an inch in diameter, of the shape of a

flattened sphere, finely reticulated, and laid generally singly on the upper side of the leaf, but sometimes on the stalk or flower-bud. I had ample means of seeing that this was the only plant selected.

I captured one or two females, and having dug up a plant of the rock-rose, confined them over it, with the result that I have just taken from it twelve ova, from which I hope to get larvæ, and rear.

[Frey says of the larva of this species:—"Caterpillar polyphagous. I bred it many years since on *Genista tinctoria*, *Spartium scoparium*, *Cytisus*, *Onobrychis*, *Rubus* (?), *Sedum palustre* are also quoted. Certainly on *Vaccinium vitis-idaea*, also on *Helianthemum vulgare*." ED.]

SCIENTIFIC NOTES AND OBSERVATIONS.

TYPES OF GENERA.—From some observations in the *Entomologist's Record* it might appear as though the types of genera given by me were arbitrarily chosen. If the student will read my argument as to the type of *Hadena*, as published in the *Entomologist's Record*, I think he will come to the conclusion that this is not so, and that the search after a type is conducted upon certain rules applying to the use of the generic title in literature. From the use of the name, according to priority, from its restrictions and extensions, from the reference of the original species by subsequent authors, the type becomes revealed. Errors in this search will arise from ignorance of the entire literature. They are also possible from unacquaintance with structure. So that the best authority will be the one who knows the most facts of the most species, and has read the most books upon the subject. I take the opportunity of protesting against Mr. Meyrick's improper use of Hübner's generic titles, and this from the view both of the lepidopterist who has a knowledge of literature and of the lepidopterist who has a knowledge of structure. Mr. Meyrick's idiosyncrasies will add to the already overburdened task of the man of letters, who will find much to undo under the rules for the application of generic names, while they seem certain, in many cases, to be set aside by the student of structure. Mr. Meyrick's speculations as to the affinities of his generic groups are, as I have said, largely in the air, lacking the support, which is so necessary, of a knowledge of the structure in the different phases of the life-history of the species.—A. RADCLIFFE GROTE, M.A., Roemer Museum, Hildesheim.

IS *MINOA MURINATA* (EUPHORBIATA) DOUBLE-BROODED?—In *Entom.*, vol. iii., p. 347, Mr. Merrin asks whether *Minoa murinata* (*euphorbiata*) is double-brooded in England, and records that towards the end of May he took several specimens, and in June others that were faded and worn; whilst on August 31st he took a single specimen quite fresh. The question never appears to have been answered, and it is probable that an occasional specimen is all that occurs of this brood in Britain. A second brood, however, is quite usual in those localities in which I have met the species on the Continent. I found it in early August, 1894, at Courmayeur, a fortnight later in the same year at Aix-les-Bains, and again fairly plentifully at Bregenz, in the middle of August, 1895. Near Aix-les-Bains it evidently fed on box, acres of this shrub forming a dense scrub on some parts of the hills about Grésy-sur-Aix.—J. W. TUTT. June, 1896.

TEPHROSIA CREPUSCULARIA AND T. BIUNDULARIA.—I should like to see the differences of opinion relating to these species cleared up. These are considered by some to be one and the same species. I am of opinion they are distinct, the browner species we only take in one wood here, among larch, and its usual time of appearance is from the end of March to the middle of April. The paler (or whiter) species does not occur until the beginning of May, and may be taken until well into June, and is generally distributed in every wood throughout the district.—A. H. HAMM, Hatherly Road, Reading. *June, 1896.* [Mr. Hamm is quite right. A long discussion in 1886, in *The Entomologist*, showed that *T. crepuscularia* occurred in March and early April, and again in July (and August), whilst the single-brooded *T. biundularia* appeared in May and early June. There is some little difficulty in Scotland (Perth), where *T. crepuscularia* appears to occur at end of April, and is single-brooded.—ED.].

PUPATION HABIT OF ARGYRESTHIA GOEDARTELLA.—In *The Entomologist's Annual*, 1858, Stainton writes of *Argyresthia glaucinella*:—"I have received the larva from Mr. Edleston, who finds them in April, feeding solitarily in the sound bark of oak and horse-chestnut trees, revealing their retreats by protruding a little reddish frass from the hole." This habit reads much like that of *A. goedartella*, which Dr. Chapman and myself have observed in great numbers in the woods around Hereford, in April, burrowing into the crannies of the birches. The larvæ are in such numbers that the trunks of the birch trees are covered with silk threads, suggesting that the larvæ have fed at the top of the tree, and only come down to find suitable places for pupation. Certainly the larva of *A. goedartella* does not feed in the bark. Does that of *A. glaucinella*?—J. W. TUTT. *June, 1896.*

HABITS OF PRESTWICHIA AQUATICA, AN AQUATIC HYMENOPTERON.—It is with very great pleasure that I record the capture of two specimens (both females) of the aquatic Hymenopteron—*Prestrichia aquatica*, Lubbock, which I found in a pond within twenty miles of Charing Cross. This insect crawls under water on various aquatic plants, using its *legs* for swimming, the wings being tightly closed. It has not been recorded since its first capture in 1862, thirty-four years ago! How is it that so *very* few entomologists pay the smallest attention to our British Parasitic Hymenoptera?

I also captured, at the same time and place, a single specimen of the beautiful Mymarid, *Caraphractus cinctus*, Haliday = *Polynema natans*, Lubbock, which uses its *wings* for swimming or flying under water.—FRED ENOCK, F.L.S., F.E.S., 21, Manor Gardens, Holloway, N. [Mr. Enock is to be congratulated on his success, following as it does so rapidly upon his discovery of the habits of *Caraphractus cinctus* last year.—ED.].

ATTEMPTED COPULATION OF SATURNIA PAVONIA AND CERURA VINULA.—I was somewhat surprised, when looking into a large breeding-cage this week, to find a male *S. pavonia* vigorously (but vainly) endeavouring to copulate with a female *C. vinula*. Has the cross ever occurred, and, if so, what was the result? I should be interested to learn if any of your readers have noticed any proclivity to wander from their own species in matters amatory with *S. carpinii*.—W. B. THORNTON, Castle Cosey, Castle Bellingham. *May 13th, 1896.* [We should suppose that two species so distant as *S. pavonia* and *C. vinula* would

never produce fertile hybrid progeny. If, however, our correspondent will look through the back volumes of the *Entom. Record*, or through *The Entomologist*, he will find a number of records where copulation has successfully taken place between vastly different species, of course without resulting in fertile progeny. Such an instance has recently been recorded (*ante*, p. 38). Pairings of *Amphidasys betularia* and *A. strataria*, of *Smerinthus ocellatus* and *S. populi*, of *Cymatophora* or and *C. ocellaris*, of *Zygaena trifolii* and *Z. jilipendulae* have proved fertile. Entomologists know very little about hybrid lepidoptera.—ED.]

APORIA CRATEGI WINTERING IN ENGLAND.—Facts are always worth recording. This winter some larvæ of *A. crataegi*, from eggs which Dr. Chapman sent me last July from Zurich, have wintered in my back garden. I am astonished, though, at the great death rate, considering the mild winter. I had not considered the matter until Mr. Merrifield asked me if a very large proportion was not killed off. I did not think this was so at first, but on examination of the survivors I computed that not more than five to ten per cent. have survived.—J. W. TUTT. *June*, 1896.

ON THE POSITION OF THE PUPA OF ACIPTILIA MIGADACTYLA, Hw. (= SPILODACTYLA, CRT.)—In his valuable monograph on "The British Pterophorina," Mr. J. W. Tutt says of this species, on p. 147, "The pupa is attached only by the anal segment, which is placed nearest to the petiole of the leaf, the head being turned to the apex of the leaf;" but the following facts will serve to show that this statement requires some modification. On the 18th inst. I searched in one of the insect's haunts for pupæ to send to a friend, and collected all that I could find, which numbered exactly a dozen; of these, six were in the position described by Mr. Tutt, but in the other six that position was completely reversed, for their heads pointed straight towards the petioles, while their anal extremities were towards the apices of the leaves. All twelve were, of course, on the upper surfaces of the leaves, and attached by the anal segments only; nine were fastened to, or extremely close to, the midrib itself; one was near the midrib, and only 3 mm. from it, while two were fixed near the edge, at a broad part of the leaf, and right away from the midrib altogether.—EUSTACE R. BANKES, M.A., F.E.S., The Rectory, Corfe Castle. *May 23rd*, 1896.

HYBERNATION OF MELANIPPE FLUCTUATA.—At Erdington Hall, Birmingham, I used to find the cocoons of *M. fluctuata* in November and December, by stripping the bark off old trees in the garden. The caterpillars had not then changed, and I kept some in tin glass-topped boxes, and watched them until April, when they turned to pupæ about a fortnight before emerging. The larvæ retained their bright green colour right up to the time of changing.—H. TUNALEY, F.E.S., 30, Fairmount Road, Brixton Hill, S.W. *June*, 1896. [This is interesting. Compare, *Ent. Rec.*, vol. vi., p. 93.—ED.]

NOTES ON COLLECTING, Etc.

RE-OCCURRENCE OF GASTROPACHA ILICIFOLIA ON CANNOCK CHASE.—On May 17th, when collecting on Cannock Chase with Mr. Basil Burnett, I had the good fortune to find a fine *Gastropacha ilicifolia* at rest. It is a male, and slightly rubbed on the right fore-wing. This find is almost a re-discovery, as the insect has not been taken here for

fourteen or fifteen years. It was found some distance from the old locality; but for the present, its exact haunt will remain a secret, in the interests of the insect. With the clue so obtained I hope to get larvæ this year. The date of my capture and the date of Mr. Atkinson's find, as mentioned in the current No. of the *Record* (p. 43), is a most extraordinary coincidence.—RICHARD FREER, M.D., Rugeley, Staffs. May 18th, 1896. [This is one of the most interesting finds of recent years. The date is most remarkable, considering the "Current Note" (*ante*, p. 43).—ED.]

THE ORIGINAL BRITISH SPECIMEN OF *LAMPIDES BOETICA*.—As time goes on, many facts are forgotten, or, on the contrary, attain unwonted dimensions. Mr. Luff has recently drawn our attention to the introduction of *Callimorpha hera* into Britain more than a quarter of a century ago, a fact which had almost been allowed to lapse, owing to the length of time since its occurrence. On the other hand, *Lampides boetica* is not an uncommon species in collections, although true British specimens probably may still be numbered on the fingers of one hand. In Newman's *British Moths*, p. 119, it is stated that Mr. McArthur took "two specimens" of *Lampides boetica* at Brighton, the first on August 4th, 1859, and the second the day following. This was repeated by Mr. Newman in answer to a query, in *Entom.*, ix., p. 92, and has often been repeated since (Dale, etc.), although, in *Entom.*, ix., p. 132, Mr. Neil McArthur wrote himself:—"In *Entom.*, ix., p. 92, it is stated that I took 'two' specimens of *L. boetica*, it should have been 'one,' which I have always understood to be the only one ever recorded." This correction was made on April 24th, 1876. Who has this original specimen of Mr. McArthur's? The other recorded British specimens appear to be, "(1) By Mr. Latour, near Christchurch, Hants, August 4th, 1859 (the same date as Mr. McArthur's original Brighton specimen). (2) By Mr. C. D. Snell, at Freshwater (Isle of Wight), August 23rd, 1878 (*Entom.*, xii., 83). (3) By Mr. S. McCaul (*Ent.*, xii., 155), a purchased specimen, stated as coming from the Cotswolds. (4) By Mr. H. E. Durban, at Bognor, on September 12th, 1880 (*Ent.*, xiii., 240, and *Ent.*, xv., 226). (5) By Miss Staples, at Bournemouth, on October 2nd, 1882 (*Ent.*, xv., 260.)."—JOHN BULL. May, 1896.

ACIDALIA PEROCHRARIA.—In vol. vii., No. 12, of the *Entomologist's Record*, a singular mistake in reference to this species is twice repeated. In "Current Notes," p. 313, mention is made of two *A. perochraria* with the comment, "Not the original specimens of Weston's." In Mr. John Bull's article, p. 317, he says, "There are, presumably, only Weston's two, supposed to be British. Are these Weston's? If not, whose are they?" The italics are mine. It would perhaps be as well to put the matter straight once and for all; the more so, as a specimen, fraudulently ascribed to Mr. Weston, was sold at the Burney sale after Mr. Stevens announced from the rostrum that it was not Weston's. There are but two authentic recorded British specimens in existence—one, captured near Redhill in 1865, by Mr. Sydney Webb, is still in his collection; the other, captured by Mr. Weston, also near Redhill, in 1869, while staying with Mr. Webb, was given by him to my late partner, Mr. H. Vaughan, at whose sale it was purchased by me. Both Mr. Vaughan and Mr. Weston (who was in our office) often spoke to me as to the details of its capture. These

specimens are recorded in the *Annual* for 1871, and in *F. M. M.*, vol. vii. In addition to these, Dr. Knaggs' *Annual*, 1871, records two specimens given to him by Mr. Birchall, apparently genuine, but with no titles. One of these specimens, given by him to Mr. Vaughan, was also purchased by me, and is still in my possession. The other one, purchased at Dr. Knaggs' sale, by Mr. Sang, was given by him to Mr. Webb, who has it still. I have, unfortunately, no note as to who purchased the so-called "Weston" specimen at the Burney sale. If it was bought on commission, perhaps its present owner is still under the delusion that it is genuine, as I noticed that the lying label was cleared with the lot. Mr. Burney's collection included two other specimens, of which one, stated to have been taken at Sevenoaks in 1880, was purchased, I think, by Mr. Bright. Other specimens occasionally turn up at Stevens' in big collections, such as Dr. Harper's, Mr. Prest's and others, but in the absence of any record of their capture they must, I am afraid, be regarded as of questionable authenticity.—C. A. BRIGGS, F.E.S., 55, Lincoln's-Inn-Fields. May 14th, 1896.

A MATTER FOR THE LANCASHIRE AND CHESHIRE ENTOMOLOGICAL SOCIETY'S CONSIDERATION.—The following astounding advertisement appears in the *Exchange and Mart* of to-day's date:—"Butterflies—three large English Coppers, alive, splendid specimens; also two Camberwell Beauties, alive. What offers, cash?—J. W. Tattersall, 17, Cagneau Street, Liverpool." Comment is needless! I have written to the advertiser asking for information as to where they were captured, etc., and await the reply with interest.—S. J. BELL, 150, Stockwell Park Road, Brixton, S.W. May 22nd, 1896.

Notes of the Season.

READING.—This has been another great *Stauropus fagi* year. Up to date (May 14th) something like ninety have been already taken. The only new fact that I have observed as to the habits of the imago is that copulation takes place during the night or very early hours of the morning, a pair having been taken *in cop.* about 5 a.m. *Endromis versicolor* has also been taken by most of our collectors, the total obtained not having been exceeded since Mr. Holland left Reading. *Tephrosia consonaria* has entirely failed. *T. crepuscularia* has been out in some numbers, but *T. biundularia* is, at present, almost entirely absent. *Leucophasia sinapis* is out in some numbers, and we hope that the warm weather will bring on a numerous second emergence.—JOSEPH CLARKE, 26, Zinzan Street, Reading. May 14th, 1896.

RUGELEY.—*Hadena glauca* is very scarce this year. *Callophrys rubi* is plentiful, and the commoner species are unusually abundant.—RICHARD FREEK, M.D., Rugeley. May 18th, 1896.

LEIGH.—On May 12th, at Leigh, I found eight larvæ of *Phorodesma smaragdaria* and one case of *Epichnopteryx reticella*.—(Rev.) C. R. N. BURROWS, Rainham Vicarage, Essex. May 14th, 1896.

FIRST BROOD OF MELANIPPE FLUCTUATA.—The first appearance for this year was on May 15th. On May 17th I saw some thirty specimens on the windows of the house, on fences and at light. Evidently the appearance of the first brood can be put down for the second and third weeks of May.—J. W. TUTT, Westcombe Hill, S.E. June, 1896.

EARLY EMERGENCES, ISLE OF MAN.—The following few notes may, perhaps, prove of some interest to the readers of the *Record*. The spell of fine weather experienced here during the early part of May caused quite a number of insects to emerge, some of which, in ordinary seasons, do not make their appearance for a fortnight or three weeks later. *Dianthoecia capsophila* was taken on May 8th, a large percentage of the specimens being worn and worthless for cabinet purposes. *Eupithecia venosata* was out in some numbers on the 10th, hovering over flowers of *Silene maritima*. *Hecatera serena* and *Smerinthus populi* on the 12th. *Dianthoecia caesia*, *Heliothis umbra*, *Cerura rinula*, *Hepialus relleda* and *Cucullia umbratica* on the 13th, the latter coming to flowers. On 17th May the following butterflies were out:—*Pieris brassicae*, *P. napi*, *P. rapae*, *Coenonympha pamphilus*, *Chrysophanus phloas*, *Polyommatus icarus*, *Pararge megacra*. For the last three or four days the weather has been somewhat cold and unsettled, and insects have been scarce. I may here mention that Mr. William Garrett, of Ramsey (who is working the north coast of the island), brought to me a number of the *D. capsophila* above referred to, which were caught by him on the evening of the 8th, some of which (judging by their appearance) had been on the wing for fully a week prior to that date.—H. SHORTRIDGE CLARKE, F.E.S., Sulby Parsonage, Lezayre, Isle of Man. May 21st, 1896.

DATES OF FIRST APPEARANCES.—Continuing my previous notes on this subject (*Ent. Record*, vii., p. 316) I have now to record the following:—*Pieris rapae* and *Anticlea nigrofasciaria*, on April 4th; *Selenia tetralunaria*, *Heimerophila abruptaria*, *Alucita heradactyla*, on April 9th; *Eupithecia vulgata*, *Saturnia paronia*, on April 15th; *Cidaria suffumata*, April 16th; *Pieris napi*, *Pararge egeria*, *Euchloe cardamines*, *Syrichthus malvae*, *Ematurga atomaria*, *Melanippe sociata*, on April 17th; *Cyaniris argiolus*, *P. petrarua*, *Coremia ferrugata*, on April 19th. *Saturnia paronia* was probably out earlier than April 15th, as it is only found on heather some distance from my house, and I had not been there since the 4th. *Cyaniris argiolus* did not appear this year until April 19th, although I daily visited its headquarters here. My earliest date for this species is a worn ♀ on March 27th, 1892. It usually appears about the end of the first week in April.—E. F. STUDD, M.A., F.E.S., Oxtou, Exeter.

NOTES ON LIFE-HISTORIES, LARVÆ, &c.

FOOD-PLANTS OF *DYSCHORISTA SUSPECTA*.—So far as I am aware, very little has yet been published concerning the larva of this species, and I was not aware of any recorded food-plant, except birch. It may, therefore, be of interest to some entomologists to know that I have just been rearing a batch from ova on *Populus balsamifera*, on which they thrive admirably. The larvæ hatched before birch was available to me. I found they would also feed on willow.—LOUIS B. PROUT, F.E.S., 12, Greenwood Road, N.E. May 12th, 1896.

ON THE FOOD-PLANTS AND PUPATION OF *MELITÆA AURINIA*.—Referring to Mr. Wolfe's remarks on the early stages of *Melitæa aurinia* (*Ent. Rec.*, vol. viii., p. 4), I venture a few observations on the habits of this species in this district. I invariably rear the larvæ on honeysuckle, which, in my experience, they prefer to the plant I take them

from—devil's bit scabious. This spring, for the first time, I found a colony feeding in a natural state on honeysuckle, from one to three feet above the ground; but I do not think the ova were laid on this plant, as there was abundance of scabious in the place. As regards pupation, they select various places whereon to accomplish this, the favourite being on the undersides of dead oak leaves, with which their haunts are freely strewn. They are suspended and well protected from the weather. I occasionally find pupæ suspended from stems of grass, reed, bilberry, and other low-growing plants, and sometimes a few blades of grass are drawn together at the top, and the pupa hangs in the centre of the tent-like construction thus formed. I cannot remember ever having found a pupa on the food-plant.—F. H. DAY, 6, Currock Terrace, Carlisle. *June, 1896.*

BREEDING BREPHOS PARTIENIAS.—In answer to Mr. Brady's inquiry, I am aware of no difficulty in breeding this species if one point is attended to. Both this species and *B. notha* must be provided with rotten wood, cork, or some similar substance into which to burrow for pupation. So far as my experience goes, the larvæ invariably perish miserably rather than adopt any other expedient. Though I made this discovery for myself, it has long been known to our more experienced lepidopterists.—T. A. CHAPMAN, M.D., F.E.S., Hereford. *June, 1896.*

CURRENT NOTES.

Has the "wizard of stagnation" laid his hand upon the Lancashire and Cheshire Entomological and the Birmingham Entomological Societies? These societies used to do good work, but they have recently sunk into obscurity. An amiable weakness may keep the same officers in power too long, even after they have signified a wish to resign. We had an example of a tendency to decadence in a London society not long since, but new rules were made, so that every member of the governing body should retire in rotation. The spirit of this rule is at present strangely set aside by an ingenious manipulation of the office of Vice-President. No ill result, however, is evident, at present, although, for some six or seven years, certain members never have retired. We trust that some of the younger members of the dormant societies will waken up the powers (?) that be.

Mr. Prout informs us that he intends to undertake a thorough investigation of the genus *Oporabia*, as we suggested; and he asks us to appeal to entomologists on his behalf for information bearing upon the subject.

Professor T. D. A. Cockerell, Las Cruces, New Mexico, U.S.A., proposes founding "a new Biological Station, and health and holiday resort for scientific persons" in New Mexico. When he went to New Mexico, three years ago, he was suffering from phthisis, and his experience has led him to form the highest opinion of the value of the climate for persons in the earlier stages of the disease. He states that "the abundance of new and interesting forms of life, especially among the insects, is remarkable," and that "many interesting general problems, such as those of the life-zones, can also be studied in New Mexico with great advantage."

Mr. Stevens will, on June 15th, sell the well-known collection of the late Mr. Trimmer Williams, a past president of the South London Entomological Society, and one of the original captors of *Boletobia fuliginaria*.

PRACTICAL HINTS.

Field Work for June.

By J. W. TUTT, F.E.S.

1.—In June the terminal shoots of furze which have turned brown should be collected for larvæ of *Anarsia spartiella*.

2.—In the middle of June the larva of *Elachista trapeziella* mines the leaves of *Luzula pilosa*.

3.—About the middle of June the larva of *Gelechia albipalpella* feeds on *Genista anglica*, the larva drawing several leaves together round the stem, and then eats them half through, thus discolouring them, and forming conspicuous clusters of yellowish-white leaves.

4.—The last fortnight in June, and the first week in July, will usually give larvæ of *Asphalia videns* if oak trees be carefully beaten or searched, the larva generally fastening two oak-leaves together.

5.—At the end of June the larvæ of *Laverna subbistrigella* may be obtained on *Epilobium montanum*. They live within the pods, on the seeds. The infested pods are usually thickened and shortened, sometimes slightly distorted.

6.—In the last fortnight of June the larvæ of *Depressaria albipunctella* and *D. choerophyllella* should be obtained on *Choerophyllum temulentum*.

7.—Towards the end of June the ash trees in the neighbourhood of Mickleham and Box Hill give larvæ of *Zelleria hepariella*. Sometimes the close white cocoons are found on the leaves during July.

8.—The last week of June and first week of July is the time to find the larva of *Euchromia purpurana*. It lives underground in a silken tube, and gnaws the roots of *Sonchus arvensis* and *Taraxacum officinale* externally.

9.—Imagines of *Hyppa rectilinea* and *Plusia interrogationis* are to be captured when resting on stumps and stones, in dull weather, in June and early July.

10.—Moths may not only be found upon or below the sugar, but a foot or two above, or on the other side of the tree, or hanging on the twigs nearest to the sugar.

11.—Imagines of *A. ripae* have been found in abundance under pieces of wood lying on the sand in June.

12.—*Acidalia contignaria* is so far a rare insect that it would pay some good collectors to spend a July holiday at Bettws-y-coed or Llanfairfechan, for a supply. The dark form is the commoner at the first named locality, the pale one at the latter.

13.—The only common British butterfly whose hibernating stage is actually in doubt is *Thymelicus thaumas*. Will those collectors who get the insect enclose a female, on a grass-plant, in a glass jar, and place her in the sun for eggs? If the latter hatch in autumn, it will confirm Buckler's observations, and contradict Hawes' statement.

14.—At the end of June, visitors to Wicken Fen should collect the rolled-up leaves of dewberry (*Rubus caesius*) for larvæ of *Tortrix dimetana*.

15.—The larvæ of *Sciaphila perterana* feed, in June, in the blossoms of *Chrysanthemum*, *Hieracium* and other *Compositae*. Their presence may be recognised by the ray-florets being turned down so as to form a covering for the larva. The insect is more common on the sea-shore than inland.

16.—Descriptions of the eggs of *Thymelicus actæon*, *Polyommatus corydon*, *Zephyrus betular*, *Thecla w-album*, *T. pruni*, *Melitæa cin-ria*, *M. athalia* are wanted to help complete the life-histories of our British butterflies.

17.—N.B.—Refer to *Ent. Rec*, vol. i., p. 23 (No. 1), and p. 47 (No. 2), also to vol. ii., p. 44 (No. 2), for three series of "Practical Hints" as to "field work in June," by present writer. Also to vol. i., p. 71 (No. 3), for a series by Mr. Fenn. [Copies of these numbers (except vol. i., No. 1) can still be obtained from Mr. Page.]

REVIEWS AND NOTICES OF BOOKS.

THE CRAMBIDÆ OF NORTH AMERICA.—By C. H. Fernald, M.A., Ph.D. [81 pp. and 9 plates. Massachusetts Agricultural College, 1896]. We have carefully examined this little brochure, and have no hesitation in saying that it is the best piece of systematic work that has been done on the American *Crambidae*. The introductory remarks are exceedingly interesting; the descriptive work is well done; the synonymic references are most satisfactory (combining, as they do, the more important European and American); the anatomical work is clearly and successfully dealt with, whilst the colour-printing (by the Heliotype Printing Co., Boston) is almost perfect. The success attending the production of this little book is all the more praiseworthy, owing to the fact that the heterogeneous material relating to the North American *Crambidae* has been published here, there, and everywhere—Germany, England, America, etc., and hence has been somewhat difficult to collect. British lepidopterists would do well to get this work for the general remarks on the group, which are of the greatest scientific value. It will perhaps surprise our collectors to find that *Crambus hamellus*, *C. pascuellus*, *C. dumetellus*, *C. hortuellus*, *C. perlellus* and *Euchromius ocellus* (*ocelleda*) are North American species. The publication of this book exhibits very clearly the study that has yet to be done in the matter of the life-histories of almost all the American species. The painful repetition of "Foodplant and early stages unknown," should stir up some careful lepidopterist to do for the N. American species what Mr. Porritt has so ably done for our British ones.

DEVONIA [Published by Henry S. Eland, 236, High Street, Exeter].—We have received Pt. iv. of *Devonia*, a new natural history magazine, edited by E. W. W. Bowell and E. H. Bazeley. It is to be published once in two months, and the subscription is 7s. The number before us is excellent, and contains, among others, the following articles:—"On the Ancient Rocks of Menevia" (F. J. Stephens), "British Land and Freshwater Shells" (E. W. W. Bowell), "Respiration in *Limnæa*" (A. E. Boycott), "The New Classification" (W. S. Riding, M.D.), "Notes on some common Fungi" (E. W. Swanton), "A Scillonian

form of *Helicella acuta*, Müll." (E. R. Sykes, M.A.), "Classification" (E. W. W. Howell), "Collectanea" (by the Editors). Under the latter head the main points of Mr. Frost's article in our own columns (*ante*, viii., 311) are very fairly criticised. The Part, as a whole, is excellent reading, presents a high level in its scientific contents, and the Editors show considerable critical ability. These should make the magazine a success. Published monthly, it would become a powerful rival to *Science Gossip*, in its present form.

SOCIETIES.

THE CITY OF LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY. —Tuesday, 5th May, 1896.—Exhibits:—Mr. May: a SERIES OF *ASPHALIA RIDENS* bred from larvæ from Thangh Bridge, Devon; the specimens were variable in colour and markings, but were, generally speaking, considerably marked with grey.

Mr. Bate exhibited *EPESTIA KÜHNIELLA* IN ALL ITS STAGES, and read the following notes:—"Last year our respected past president gave me some larvæ of *Epestia kühniella*, feeding on a packet of Allinson's food. Finding that there were very few of them inside, I determined to breed a number if possible, and therefore shut them up and left them to their own devices in a large glass jar—a very large number of larvæ was the result. They mined away during the winter, occupying little silk-lined runs, and quickly demolished the whole quarter-pound packet, when I gave them wheat flour. Mr. Tutt having kindly drawn my attention to the fact that the sexes could be differentiated in the larval state, owing to the genital organs of the male being visible, I sorted out a number, and fed them separately. The result is shown in the series of 10 bred from the spotted ones, and 11 from the unspotted, which I venture to hope represent the two sexes. Of course, where the ovipositor is protruded, there can be no doubt of the sex, but I freely confess I am not able to go beyond this. The larvæ are cream-yellow until the last few days before pupating, when they become pink; all have, all through, brown head, brown shield on second segment, a row of 22 black tubercles each side of the dorsal line, each of which emits a brown hair; one central shining-brown spot on the 13th segment* with no hair, brown anal flap; a row of 11 tubercles either side of the first row, that on the third and 12th segments having a black ring round it, and each emitting a single hair. The spiracles are lighter brown. The spot on the ninth segment* is distinctly an organ situated in the interior of the larva, and shifts its position as the creature walks. The pupa is ochreous-brown, shaded, and darkens considerably before the insect emerges. The larvæ have a great liking for eating the pupæ. The eggs are oval, quite white when laid, but turning slightly yellow soon afterwards, and may probably alter further before hatching. I have been unable to see copulation taking place in either of the jars containing imagines bred from all spotted or all plain larvæ, although they pair freely in the jar where the larvæ were mixed. Realizing that the females may be parthenogenetic, I have saved the presumed males in their jar, and will report if I obtain larvæ there, as that will indicate that the spot is

* We would suggest to our contributors that this antiquated method of describing larvæ should be dropped. A larva consists of (1) Head. (2) Thorax (prothorax, mesothorax and metathorax). (3) Abdomen (segments 1-10).—Ed.

not a sexual mark [What spot?—Ed.]. I exhibit living ova, larvæ, pupæ and imagines, and shall be pleased if members will help themselves to what they require. The perfect insects sit with their heads considerably raised, antennæ lying along their backs, and the females with the body bent upwards and the ovipositor protruding. They remain quiet, except in the presence of the opposite sex, when they flutter wildly, running round and round until copulation takes place. The period of this extends to several hours. Stainton's sexual distinction of the *Ephestiæ* reads as follows:—"Antennæ of male not curved near the base, in the male the base of the costa beneath with a tuft of hair."

Messrs. J. A. Clark and Nicholson exhibited their SERIES OF BOMBYX QUERCUS AND B. CALLUNÆ to assist in illustrating a paper on those species read by Capt. B. B. Thompson, who showed his own series, and those of Mr. A. J. Hodges; among the latter were two males, supposed to be the var. *roboris*. Relating to COLLECTING OBSERVATIONS, Mr. J. A. Clark said that *Cyaniris argyolus* was well out at Epping Forest, and Mr. Tutt said that he had seen *Euchloë cardamines* at Hereford on April 10th. Mr. Bayne recorded a fresh specimen of *Taeniocampa munda* at the New Forest on May 3rd. Mr. May said that an Erith correspondent, named Goddard, had found larvæ of *Nyssia hispidaria* at Darenth and Chattenden Woods, feeding on Spanish (or sweet) chestnut, but all except one were "ichneumoned." Mr. Tremayne stated that he had a brood each of *Amphidasys strataria* and *Ennomos quercinaria* feeding on whitethorn in separate jars. The leaves which had been nibbled, or partly eaten, by the *A. strataria*, had almost immediately turned brown round the edges and dried up, while those which had been similarly treated by the *E. quercinaria* remained quite fresh. It was suggested that, in the case of the *A. strataria*, the appearance might be caused by the action of some liquid (? acid) secreted in the mouths of the larvæ, such liquid not being present in *E. quercinaria*.

ENTOMOLOGICAL SOCIETY OF LONDON.—May 6th, 1896.—Mr. Champion exhibited specimens of *Amara fæmelica*, Zimm., from Woking, Surrey, a RECENT ADDITION TO THE BRITISH LIST. He also exhibited, on behalf of Mr. Dolby-Tyler, a SERIES OF EBURIA QUADRINOTATA, LATR., from Guayaquil, Ecuador, showing variation in the number of the raised ivory-white lines on the elytra, there being sometimes an additional mark exterior to the short basal line, and sometimes an additional one on the inner side of the second line. Mr. Gahan said he did not notice anything remarkable in the specimens except in the arrangement of the spots. Mr. Horace Donisthorpe exhibited a SPECIMEN OF PTEROSTICHUS GRACILIS WITH THREE TARSI on one leg, taken near Weymouth last month. Mr. G. T. Porritt exhibited a STRIKING SERIES OF SPILOSOMA MENTHASTRI which he had just bred from Morayshire ova, the ground-colour of the specimens varied from the usual white, through shades of yellow, and dark smoky brown. Mr. Merrifield exhibited specimens of *Gonepteryx rhamni* bred from larvæ found in North Italy and Germany, the PUPÆ of which had been SUBJECTED TO VARIOUS TEMPERATURES. He said that high temperature appeared to cause an increase of yellow scales in the female, and low temperatures generally reduced the size of the orange discal spot on the fore-wings of both sexes. He also exhibited some bred specimens of species of Vanessids, the result of experiments tried with a view to ascertain the extreme of high temperature that the pupæ would bear, and its results.

The species exhibited included *Pyrameis atalanta*, *Aglais urticae* and *Euranessa antiopa*. Mr. Merrifield said that the effects on the imago produced by temperature were being made the subject of systematic research by Professor Weismann, Dr. Standfuss, Mr. E. Fischer and others. Mr. Elwes asked if these experiments had been made on pupæ only, or on the larvæ as well. Mr. Merrifield said that the results were only noticeable when the experiments were made on pupæ. The effect of them on larvæ was not apparent. Mr. Kirkaldy exhibited and made remarks on ova of *Notonecta glauca* var. *furcata*. Mr. Tutt exhibited living LARVÆ OF *APAMEA OPHIOGRAMMA*, together with the grass on which it was feeding. He said the species was formerly considered rare in Britain, but was now found freely in any localities where Ribbon grass (*Digraphis arundinacea*) was plentiful. The Secretary read a communication from Mr. E. Meyrick on the subject of Prof. Radeliffe-Grote's criticisms, contained in his paper published in the proceedings of the Society, 1896, pp. x.—xv., on the USE OF CERTAIN GENERIC TERMS by Mr. Meyrick in writing on the group of Lepidoptera known as the Geometridæ. Mr. Meyrick stated that he rejected the main assumption on which the criticisms were based, viz., that the genera used by Mr. Grote were without descriptions.

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.
—May 14th, 1896.—Mr. Enock exhibited specimens of two very RARE AQUATIC HYMENOPTERA: *Prestrichia aquaticæ*, which uses its legs in swimming, and which has not been recorded since its first capture in 1865, and *Caraphractus cinctus* = *Polynema natans*, which uses its wings in swimming. Mr. R. Adkin: a bred series of *MELANIPPE HASTATA*, FROM SUTHERLAND, with series of the same from Sussex and co. Cork. The larvæ of the first were fed on *Myrica gale*. The Cork series had a pale ochreous tone, instead of the usual dead-white ground. The southern series were very uniform, whereas the northern examples varied considerably in the black markings. Mr. Barrett: series of *ABRAXAS ULMATA* AND *PIERIS RAPE, V. CRUCIFERARUM*, FROM JAPAN. The former were of the British type, but the latter equalled *P. brassicæ* in size, had a considerable suffusion of black from the base, and in some of the females a partial fusion of the spots. In the discussion which ensued it was suggested that it might be the result of abundance of succulent food. Mr. Carrington remarked on the hardy constitution of the species in Canada, where it experienced extremes of temperature from— -60° F. to 138° F. Mr. Tutt noted the increase in abundance and the variation of *P. rapæ* in America, where it had survived, after a great struggle with a closely allied indigenous species, with which it was supposed to have interbred, and which was now very rare. Mr. Tutt, for Mr. Merrifield: a number of SPECIES OF BUTTERFLIES BRED FROM PUPÆ SUBJECTED TO DIFFERENT TEMPERATURES, viz., *Aglais urticae*, *Pyrameis atalanta*, *Euranessa antiopa*, and *Gonepteryx rhamni*. He described the variations in detail, and remarked that it was mainly the upper sides which had been affected, whereas the undersides, which in the Rhopalocera were developed for protection, were less influenced. The melanism of *Triphaena orbona*, and that of such a species as *A. urticae*, were not parallel cases of variation, as, in the dark aberrations of the former, it was the upper side that was protectively coloured. Mr. C. Clark: living specimens of the PARASITES OF THE STICKLEBACK, with a micro-photograph $\times 30$ of the same, the organs of attachment being well shown. Mr. Tutt read a paper entitled, "Is COLD

THE CAUSE OF MELANISM IN SCOTCH SPECIMENS OF *TRYPLHENA ORBONA*," in which he showed, by magazine references, that the area of distribution of the melanic forms of this species by no means corresponded with the coldest portions of the country, and that at Forres the willows flowered quite as early as in the S. of England. He was of opinion that the variation was wholly brought about by utility, and that the species was protectively coloured. In the subsequent discussion several members considered that the dark variation in this species was a return to an ancestral form, and that every evidence showed that the processes of evolution were still in progress.

CAMBRIDGE ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—May 15th, 1896.—Mr. Rickart exhibited a case of beetles collected by himself at the Cape, including the rare genus *Ischnostoma*. Mr. Fleet exhibited specimens, found at Cambridge, of the LARVÆ OF *PLUSIA MONETA*; the young larva is very different in form and habit from the adult, and lives in a bunch of terminal leaves of Monkshood fastened together. Dr. Sharp remarked on a work just published in Germany, by Dr. Standfuss; this gentleman has made EXPERIMENTS IN CROSSING SPECIES AND VARIETIES OF LEPIDOPTERA, and some of his results are certainly of interest: among other results, he finds that hybridisation between closely allied species produces a remarkable amount of hermaphrodite progeny. He also exhibited one of the BASKET WORMS discussed at the last meeting; the specimen was extracted from its basket, and showed great differences when compared with ordinary caterpillars. He also showed another very EXCEPTIONAL LARVA FROM MADAGASCAR, which he believed to be one of the "slug-worms" of N. American naturalists. He then read a paper upon "THE DESTRUCTION OF FORESTS AND ITS RESULTS." He said that much wanton destruction of natural conditions occurs in all parts of the world, which, in the long run, impoverishes humanity. In connection with this the Californian Academy of Sciences has recently drawn up a report for presentation to the Congress of the United States, protesting against such reduction of forest preserves; "it being a trespass of an inheritance which should by every legitimate means be preserved by this generation for those who are to come after. It has been conclusively proven that the terrible droughts, floods, and famines in Southern Russia are directly caused by the destruction of timber. It is also a well established fact that the droughts and failures of crops in a large area of France are due to change in climate caused by the destruction of forests since the Revolution." In Britain, this does not interest us so immediately, as we have a sufficient and moderate rainfall without forests, but in our Colonies it is not so. He had information that much unnecessary destruction occurred; and that in New Zealand much loss had recently been caused by drought. The preservation and management of forests ought to be considered one of the most important duties of Colonial Governments. From a naturalist's point of view, it was sad to think that this destruction of forests involved the extermination of many of the animals of the world, without our having acquired any knowledge about them, and in many cases without our having even seen them. It appeared from another report, made by the Californian Academy of Sciences, that the only remaining herd of N. American buffaloes in the Yellowstone Park had been wantonly destroyed by hunters or sportsmen, as had also the only colony of beavers in the same district.

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The Hibernating stages of British Butterflies.

By J. W. TUTT, F.E.S.

Of the 65 butterflies considered as British by Newman, in his *British Butterflies* (i.e., excluding *Argynnis niobe* and *Parnassius apollo*) he gives, on p. 17, the names of 42, the hibernating stage of which has been "ascertained beyond all possibility of doubt." This leaves 23, the hibernating stage of which were in doubt. Of the 42 about which no doubt then (1871) existed, there are seven certainly wrong, and of one (*Chrysophanus dispar*) the hibernating stage has never been determined by observation, although the logical sequence of events would suggest that Newman is correct.

In order to correct some of the errors into which Newman had fallen, and to add fresh information, Fitch published, in 1879 (*Ent.*, xii., pp. 1-4), a paper on the "Hibernation of British butterflies." He makes one very grave error (connected with *Argynnis adippe*), and also takes it for granted, like his predecessors, that *Pyrameis cardui* hibernates as an imago. Besides these, he queries the stage in which no less than 12 species pass the winter, and gives *Nomiades semiargus* as "unknown."

Since then the hibernating stage of the whole of these has been satisfactorily determined, except so far as relates to *Chrysophanus dispar* and *Lycaena arion*. With the exception of the verification of the stage in which *Everes argiades* hibernates, and the verification (or otherwise) of the statement made by Hawes relative to *Thymelicus thaumas*, we may consider that the hibernating stage of all our other British butterflies are now known. The stage in which *C. dispar*, *L. arion* and *E. argiades* hibernates is more likely to be determined by European collectors, but British collectors should be able to clear up the doubt surrounding *T. thaumas*.

Newman stated (*Brit. Butts.*, p. 16) that:—"It is a most interesting fact, and one that cannot be too strongly impressed on the memory, that all the individuals composing one species of butterfly always hibernate in the same state: each adheres strictly to the practice of its species." Fitch says:—"The hibernation of a species is strictly constant. A certain larva, even from the same batch of eggs, will occasionally feed away from its brethren, and appear as an imago in the autumn, while the normal habit of the species is to hibernate in pupa or even in larva, as the case may be. Again, when May individuals pupate together it sometimes happens that some are perfected pre-

maturely in autumn, the rest passing the winter in their penultimate state. Such specimens are, I believe, invariably infertile, and play no part in the continuation of their species. Hence they appear and die, but in no way affect the constancy of the hybernation." This notion of infertility was very common a quarter of a century ago, but continual breeding has taught us that such specimens as emerge in the autumn instead of spring are fertile, and go through the ordinary courses of existence just the same as if they emerged in spring. They pay the penalty of their haste usually in the destruction of their progeny, which winter overtakes before they have reached that stage in which alone they can survive its rigours.

Of the fact that, with very few exceptions, the same species of butterfly always goes through its hybernating period in the same stage, we are perfectly satisfied, and we think that Scudder has fallen into grave error in *Butterflies of the Northern United States and Canada*, where he states that *Pyrameis cardui*, *P. huntera*, *P. atalanta* and *Aglais milberti* pass the winter, some specimens as imagines and others as pupæ, and that the former lay eggs in April and May, the latter disclosing their inmates, which pair and lay eggs in June. Such a statement is evidently based on erroneous or incomplete data.

It may be well to briefly summarise the facts known about the hybernation of the various species. Of those in the Super-family HESPERIDÆ the following appear to have been long since determined:—

<i>Nisoniades tages</i> .—Larva (Fitch, Hellins).	<i>Thymelicus actæon</i> .—Larva (Buckler, Zeller, Fitch).
<i>Syrichthus malvae</i> , Pupa (Hellins, Zeller, Fitch).	<i>Thymelicus lineola</i> .—Egg (Hawes).
<i>Pamphila sylvanus</i> .—Larva (Mühlig, Zeller, Fitch, Buckler).	

The following have only been recently cleared up, or still remain in doubt:—

Pamphila comma.—"Egg (Hellins)." There can be no doubt that *P. comma* hybernates in the egg state. Mr. Hellins had eggs on August 24th, 1867, which hatched on March 27th, 1868.

Thymelicus thaumas.—"Larva (Fitch, Hellins)." It was generally assumed that Hellins' observations—"Eggs, July 29th, 1865, hatched August 12th, small larvæ (2mm. long), died November," and "eggs, July, 1876, hatched August 15th; spun silken hybernacula shortly afterwards, and then came to grief"—settled the point that this species hybernated as a larva. But Hawes writes (*Ent.*, xxv., p. 177) that "it may be well to correct an error with regard to *H. thaumas* and *H. lineola* which appears to be accepted as fact. Neither species passes the winter in the larva state. The eggs are laid at the end of July and beginning of August, and remain as such until the following spring, emerging about April 20th." As we nowhere read that Mr. Hawes has reared *T. thaumas*, we are inclined to think, in the face of Hellins' observations, that he has made an error of observation.

Carterocephalus palaemon.—"? Larva (Fitch). Larva (Buckler, Hellins, Chapman)." Buckler received eggs June 7th, 1883; hatched June 11th, 1883; hybernated in silken cases as large larvæ (1 inch long) from October until February; pupated towards the end of March.

Of those in the division LYCENIDÆ, less than two-thirds were certainly known when Fitch wrote his article. Those that were known were as follows:—

Cyaniris argioides.—Pupa (Buckler).
Cupido minima.—Larva (Hellins, Fitch).
Polyommatus astrarche.—Larva (Zeller, Fitch).
Polyommatus corydon.—Larva (Fitch).
Polyommatus bellargus.—Larva (Hellins, Fitch).
Plebeius agon.—Egg (Fitch, Buckler).

Callophrys rubi.—Pupa (Buckler, Harwood, Barrett).
Lampides boetica.—Egg (Millière).
Thecla w-album.—Egg (Newman, Fitch).
Thecla pruni.—Egg (Newman, Fitch).
Zephyrus betulae.—Egg (Newman, Fitch).
Zephyrus quercus.—Egg (Newman, Fitch).

Nemeobius lucina.—Pupa (Newman, Fitch).

A question appears to have arisen about *Z. quercus*, owing to an egg having been deposited on a willow leaf, Mr. Hellins writing (*E.M.M.*, xiv., 112):—"The willow leaf would before long have fallen from the bush and decayed; and if the larva is not hatched till the spring, what meanwhile becomes of the egg?" It would appear that this proceeding must have been quite unusual, the egg being (or is generally supposed to be) laid on oak twigs, where the egg is safe enough. Can anyone say he has ever found an undoubted *Z. quercus* egg on an oak twig? or indicate an exact record on the point?

There appears also to have been some uncertainty about *P. astrarche*, for although Zeller gives it correctly as hibernating in the larval stage, Newman gives it as doing so in the "egg." Buckler confirmed Zeller's testimony. He obtained eggs September 13th, 1877, which hatched September 19th; larvæ hibernated from November 3rd to March 7th, 1878; pupated May 15th-24th.

Fitch queries *Lampides boetica* as hibernating in the egg state, but Millière's statement is very definite.

The species whose hibernating stage was doubtful until quite recently were numerous. Fitch (1879) queried several as not certainly known. Some of these have, and some have not yet, been cleared up. Those which were then uncertain are as follows:—

Chrysophanus dispar.—"? Larva (Fitch). Larva (Newman)." This has never been positively determined, although Newman gives it as one of the "certain" species. Does anyone know how the larva of the Continental var. *rutilus* hibernates?

Chrysophanus phloeas.—"? Pupa (Newman). Larva (Moncreaff, Harwood, Hellins)."—Fitch says, "the only authority I can find for the hibernation of this very common species is Mr. Moncreaff's note at *Ent.*, iii., p. 41." The larva feeds up very slowly until December, is very sluggish until the end of January, when it commences to feed again.

Lycaena arion.—"? Larva (Fitch)." It is well known that the egg hatches in the summer, and we believe that the larva is to be obtained again in the following spring, so that it is very probable that the species hibernates in the larval state.

Nomiales semiargus.—"Unknown (Newman, Fitch). Pupa (Rühl)." Quoting Rühl, I write in *British Butterflies*, &c., p. 165:—"The pupa lives through the winter. It is attached by its anal segment to a stalk of its food-plant, and has also a silk girdle round the waist."

Polyommatus icarus.—"Larva (Kaltenbach). ? Larva (Fitch). Egg (Newman)." This is another of Newman's very many errors published in his *British Butterflies*. The observation of Kaltenbach having been repeatedly verified. Buckler had larvæ which hibernated from

September 13th, 1880, until March 18th, 1881, whilst Hellins hibernated larvæ, obtained August 30th, 1875, from October, 1875 until February 5th, 1876. Dr. Jordan has often found larvæ of this species hibernating in Devonshire, when searching for cases of *Coleophora discordella*, on *Lotus corniculatus*.

Everes argiades.—Lang says that the larva of the var. *coretas* of this species is to be found "in the autumn and early spring (after hibernation)." This wants verifying badly.

It will be observed that we are yet somewhat in doubt about *Chrysophanus dispar*, *Lycaena arion* and *Everes argiades*. The circumstantial evidence available suggests that both *C. dispar* and *L. arion* hibernate as larvæ.

Of the Division PAPILIONIDA, the hibernating stage of all the species was well-known in the families PAPILIONIDÆ and PIERIDÆ, except in the cases of *Colias edusa* and *C. hyale*. The method of pupation of the other species are given correctly by Fitch, as follows:—

<i>Papilio machaon</i> .—Pupa.	<i>Pieris napi</i> .—Pupa.
<i>Aporia crataegi</i> .—Larva (young).	<i>Pieris daplidice</i> .—Pupa.
<i>Pieris brassicæ</i> .—Pupa.	<i>Euchloë cardamines</i> .—Pupa.
<i>Pieris rapæ</i> .—Pupa.	<i>Leucophasia sinapis</i> .—Pupa.
	<i>Gonepteryx rhamni</i> .—Imago.

The hibernating stage of the two doubtful species has been practically cleared up, and it is now evident that Newman's statement that *C. edusa* hibernates as an "imago" is entirely wrong, and that the suggestion of Fitch that it hibernates in the larval state is true, except that it is possible that the species never does hibernate in any stage in Britain: nevertheless the larval is the normal hibernating stage in Southern Europe. Newman is also absolutely wrong in giving *C. hyale* as passing the winter in the "imago" state. Fitch suggested the larval, in 1879, as the stage in which *C. hyale* hibernates, and this has since been verified by Williams. Like *C. edusa*, this species also probably never hibernates in Britain.

The hibernating stages of the NYMPHALIDÆ have been long known, except in the case of *Argynnis adippe*, *Pyrameis cardui* and *Anosis archippus*. The species hibernate as follows:—

<i>Dryas paphia</i> .—Larva.	<i>Melitæa aurinia</i> .—Larva.
<i>Argynnis lathonia</i> .—Larva.	<i>Vanessa io</i> .—Imago.
<i>Argynnis aglaia</i> .—Larva.	<i>Euvanessa antiopa</i> .—Imago.
<i>Brenthis euphrosyne</i> .—Larva.	<i>Aglais urticae</i> .—Imago.
<i>Brenthis selene</i> .—Larva.	<i>Eugonia polychloros</i> .—Imago.
<i>Melitæa athalia</i> .—Larva.	<i>Polygonia c-album</i> .—Imago.
<i>Melitæa cinxia</i> .—Larva.	<i>Pyrameis atalanta</i> .—Imago.
	<i>Limnitis sibylla</i> .—Larva.

Fitch follows Newman without question as to the stage in which *A. adippe* hibernates. Newman says:—"The caterpillar lives through the winter." Fitch gives "Larva." Buckler, on August 20th, 1877, had a female that laid 54 eggs. On August 25th, 1877, he received 86 eggs. These all changed colour, went over the winter, and hatched between March 2nd and 21st, thus proving that *A. adippe* hibernates as an egg. On August 7th, 1882, he had 26 more eggs, and these went over until February, when they hatched. Although *A. adippe* hibernates as an egg, its state is not so far different from that of its congeners, which hibernate as young larvæ, for the larva is formed in the egg of *A. adippe* soon after it is laid, although it does not hatch until the next spring.

The other doubtful species are *Pyrameis cardui* and *Anosia archippus*, and, strange to say, these two species exhibit exactly parallel habits in the Old and New Worlds respectively, and what is said about one applies equally to the other. Both are said by authors to hibernate in the imago state. No author has ever adduced an atom of direct evidence that either species does so, except Scudder, in the case of *A. archippus*, whose statement that woodmen sometimes detect a colony hibernating in a hollow tree wants verifying. It is possible that in the sub-tropical homes of both species they are continuously brooded, and that such hibernation as each is capable of is passed in the larval state. Probably neither *P. cardui*, in temperate Europe, nor *Anosia archippus*, in temperate America, can hibernate at all. All individuals that are found there when winter approaches are exterminated, be they imago, egg, larva or pupa. The temperate regions of the Old and New Worlds are continuously populated by specimens which migrate in spring from the sub-tropical haunts of *P. cardui* and *A. archippus* respectively, and their progeny, emerging in the summer, attempt to be continuously brooded, and are exterminated forthwith [*Colias edusa* and *C. hyale* are exactly parallel cases in Europe].

The hibernating stage of most of the SATYRIDÆ has long been beyond doubt, but still that of some few species has been uncertain until very recently. Those that were certainly known in 1879 were:—

Apatura iris.—Larva.

Hipparchia semele.—Larva.

Epinephele ianira.—Larva.

Epinephele tithonus.—Larva.

Coenonympha tiphon.—Larva.

Euodia hyperanthus.—Larva.

Erebia aethiops.—Larva.

Melampias epiphron.—Larva.

Melanargia galatea.—Larva.

The uncertain species at that time were:—

Pararge megera.—This species Fitch gives, “? Larva,” and adds:—“Two or three Continental authors say that this species ‘überwintert’ as a pupa. This agrees with the present idea as to its nearly (*P. egeria*).” Zeller gives it as hibernating as a “larva” (*Stett. Ent. Zeit.*, xxxviii., 307). Newman is correct in giving this species as hibernating in the larval stage. Hellins discovered that the insect hibernated in the larval stage in 1881.

Pararge egeria.—Fitch gives “? Larva.” Newman (*Ent.*, iii., 217) says that it “remains as a pupa throughout the winter;” in *Brit. Butts.*, p. 86, he says, “the caterpillars hibernate early, and are full-fed by the end of the following March.” The caterpillars do not hibernate “early,” although they hibernate small. Fitch inclines to the hibernation as a pupa, and says:—“From present information the earlier account appears to be correct.” This is not so; the larva hibernates and commences feeding very early in the spring. Hellins knew that it was the larva that hibernated as early as the winter of 1872-1873. Probably Newman knew this, and hence his change of opinion. It is strange that Fitch did not. Greene says that he has “several times met with the pupa of *P. aceris* suspended from blades of grass when digging at the roots of trees. It is of a beautiful grass-green colour, and passes the winter in the pupal state.” We have not the remotest doubt that if these pupæ were found in autumn they would have emerged the same autumn, and if in spring that they had spent the winter as larvæ.

Coenonympha pamphilus.—Fitch gives “? Larva.” Newman does

not mention the hybernating stage in *Brit. Butts.*, p. 101, although on p. 17 he gives as certain the larval as the hybernating stage. Von Prittwitz (*F.M.M.*, vi., p. 223) gives it as hybernating in the "egg." Hellins hybernated the larvæ from August, 1874, until February 13th, 1875, and this is, as a matter of fact, the stage in which *U. pamphilus* does hybernate.

Such a paper as this summarises the advance that has been made in one direction during the last 25 years, and shows us how completely out-of-date Newman's *British Butterflies* is, and how much beginners, who use it as their first text-book, have to unlearn even on such a subject as this, and when we consider that every page of Newman's book went through the hands of Mr. H. Doubleday, who represented at that time the highest point of British lepidopterology, we can pride ourselves that the labour of the last quarter of a century has chronicled a distinct advance in the facts that have accumulated about our British butterflies.

Melanippe fluctuata.

By LOUIS B. PROUT, F.E.S.

(Continued from p. 57).

Several authors, right down from the time of Borkhausen, have endeavoured to arrange the principal varieties of this species in either two or three tolerably distinct forms; but their results do not entirely agree, and it is pretty evident that the forms pass one into another by very easy gradations. Borkhausen himself distinguishes chiefly two forms, the white or whitish and the dirty yellowish-white, and remarks that he finds the latter invariably larger, but, as he can see no other difference, he does not propose to erect a separate species. Duponchel figures two forms, the common one, and a darkish variety inclining to the var. *neapolisata* (vol. v., part i., pl. 189, figs. 3 and 4). Hübner figures a very brown form, strongly marked (fig. 249); I have occasionally seen specimens of the form which I believe it represents, though rather more ochreous brown than his figure. Treitschke says that the species is very variable, and that the mountain forms are smaller and with white ground colour, those of the valleys larger and more yellowish. He is also the first, so far as I have observed, to mention the existence of forms with an entire central band, and he says that these have "at first sight much similarity with *M. galiata*."

Haworth makes two species, according to the form and breadth of the central fascia, *fluctuata* for the normal broader-banded form, *costorata* for the narrow-banded.

Herrich-Schaeffer figures (figs. 292, 294) two of the forms with the central costal blotch much reduced, the forms frequently known in this country as ab. *costorata*, Haw.

Guenée gives, besides the type, three varieties:—

- A. Central area, forming a complete band, blackish.
- B. The "*neapolisata*" form.
- C. The form with the central fascia much reduced, and very few other dark markings.

This is probably about the most reasonable summary which can be made of the ordinary European forms. Snellen's (*Vlinders*, i., p. 668) seems to me less satisfactory; like all other authors, he recognizes

Linnaeus' own form as the type, but only gives two varieties, and these are hardly very extreme forms; var. i. being the common form with darker dusting of the ground colour, coal-black costal half of central fascia, and indication of the lower half by dark-grey rings; var. ii., the dusky-grey form covered by darker wavy lines, and with the central fascia not strongly contrasted. This last, I believe, is generally reckoned as one of the sub-varieties of var. *neapolisata*. It will be seen that Snellen does not notice at all the frequent forms with the normal dark markings *reduced*, the var. C. of Guenée.

The greatest extreme to which variation can run in this direction is seen in the ab. *immaculata* of Tutt (*Ent. Rec.*, i., 322); his description, "in its highest developed forms, pure white," would accurately speaking, preclude all forms known to me; but from the meaning of the name, and the immediate context in Mr. Tutt's paper ("Melanism and Melanochroism"), I think we are quite safe in applying it to all forms in which the central fascia is *entirely wanting*; of course, the black central dot remains, being common to the family, if not, indeed, to the Lepidoptera generally, and being entirely independent of the brown central fascia. So far as I can recollect, I had never seen this extreme form until quite recently, but a few months ago, my kind correspondent, Mr. W. E. Brady, of Barnsley, sent me for inspection a perfect example of it from his own district, and I have since seen a similar one in the Zeller collection, and one almost as extreme, though with a slight remnant of the dark colour round the central spot, in that of the late W. H. Tugwell. Mr. M. Farrant also records one at Taunton (*Entom.*, xxiii., 100).

The forms with the central fascia entire run in two or three different directions in other respects, and are somewhat difficult to classify. The two chief are seen in the var. *acutangulata* of Romanoff, in which the ground colour is nearly or quite white, and the fascia therefore clearly defined; and the ab. *incanata* of Reuter, in which the ground colour is darker marked, though the fascia is still considerably darker than the ground. It is in the direction of these latter aberrations that the classificatory difficulty comes in; for, on the one hand, many almost normal forms have the central fascia *indicated* as far as the inner margin, either by mere dark rings (Snellen's "var. i."), or with varying degrees of intensity until the true *incanata* is reached (compare Sepp's figures, vol. iii., pl. xxiv.); while, on the other hand, some specimens dark enough to be classified as *neapolisata* have also a fairly well-defined and complete dark central fascia (Dup., 189, 4). My bred series from Hale End admirably illustrates the former transitions; my very few *neapolisata* do not exemplify the latter, but I fancy I am not mistaken in supposing that a long and representative series would do so. I have also an interesting specimen, kindly presented to me by our member, Mr. H. Sauzé, and taken at Sydenham, which is, in a measure, intermediate between var. *acutangulata* and the ordinary run of banded aberrations; the ground-colour and hind-wings tend towards the pale coloration, not transversely lineated, and the central fascia stands out very distinctly. On the whole, however, I incline to regard it as belonging to the *incanata* form; the true var. (and ab.) *acutangulata* has the basal patch white, the basal fascia being only indicated by a dark line at its outer boundary.

Habits of Larva and Pupa of *Thecla pruni*.

By S. G. C. RUSSELL, F.E.S.

I had a very long search in the haunts of *Thecla pruni* for larvæ of the species, but only succeeded in finding one, although I came across ten pupæ. I beat out a good number of larvæ, however, and think that, accordingly, the larva hides successfully, although, strange to say, the one I found was not difficult to see. It was quite full-fed, and was reclining on the topmost sprig of a blackthorn bush, in a curved position, stretched at full length, and not humped—apparently feeding. I say “apparently feeding,” as the larvæ I kept in the dark, in small tin boxes, fed freely. The larva of *Zephyrus betulae* feeds at night. Had I worked a week earlier, I must, I now believe, have found larvæ at rest on the front side of the leaf. One larva of *T. pruni* that I got, which was younger than any of my others, was much more deeply tinged and marked with red. As they get nearer to being full-fed, this marking seems to become more of a yellow colour, and then they are not unlike *Callophrys rubi* larvæ, although darker. The pupæ I found were all (except in two instances) attached to the front of the blackthorn leaf, and plainly visible, forming, however, an excellent imitation of a bird's dropping. In the two exceptions mentioned the pupæ were attached to the twigs. These I exhibited at the meeting of the Entomological Society on June 3rd last. My opinion is that the larvæ, during the day, rest quietly upon the upper side of the leaf, and that their colour assimilates well with that of the leaf, and that they feed and move during the night. *Zephyrus betulae* larvæ lie under the leaf.

Entomology and Romance.

By JOHN BULL.

In his article on “Entomology and Romance” (*ante*, vol. vii., pp. 308–312), Mr. Frost complains of the want of romance in scientific writings. I was always under the impression that nine-tenths of entomological literature, so-called, was pure romance.

Following Mr. Frost's example, I find the dictionary defines “romance” as “A falsehood or untruth; fiction; to forge and tell fictitious stories.”

I think all observant naturalists will agree with me that much of what is called entomological literature comes very comfortably under this head. Take the June number of the *Entomologist*. The article, “Fungi parasitic on butterflies,”* is evidently pure fiction; that “On the Identification of *Danaïdes pterippus*” shows how to “forge” a good story; another, entitled “Remarks on Additions to the British Lepidoptera during the past ten years,” deals with the modified “untruths” told by various people. Read Mr. Arkle, too, on “Apterous females,” or Mr. Wells on “*Epunda lichenea* larvæ in the New Forest,” and so on.

Now, when a man reads fiction, he must know the truth before he can recognise that it is fiction. Very few entomologists are well-informed about insects, hence they read fiction as if it were truth. The humour escapes them, and they vote the fiction sad and funereal.

*The fungi described are evidently the male scent glands, or androconia.—J.B.

It is useless to complain that entomological romances are dry to readers, because the latter cannot see the joke. One cannot expect authors to be always writing, *à la Punch*, "This is a joke!"

Very few entomologists look upon Newman as a romancer. Yet probably one-third of his book, *British Butterflies*, is pure romance, *i.e.*, it is fiction—untrue. Take his description of the process of exuviation when the larva becomes a pupa (pp. 12-13); there is scarcely a word of truth in it. Read his note on hybernation (pp. 16-17), where he states that *Polyommatus astrarche* and *P. icarus* hybernate as eggs; *Argynnis adippe* as an egg; *Colias edusa* and *C. hyale* as imagines—all fiction—every word of it. Read his descriptions of the larvæ, with the living caterpillars before you. Then you begin to see his humour and to understand the romance.

But of all the romancers who have unwittingly played off their humour and imaginative faculties on innocent entomologists, commend me to Mr. Dale. Some years ago he wrote as a supplement to *The Young Naturalist*, a set of papers called "British Butterflies." The fiction here is so clear that even the ignorant can find it. Compare (p. xxxi. and p. 166) the two different descriptions (!) of the egg of *Eugonia polychloros*, copied from Newman and Buckler respectively. But it is in quotation that Mr. Dale excels. Take this, relating to *Eucanessa antiopa*, for example:—

STEPHENS, *Illus. Haust.*, i., p. 45.

"No insect is more remarkable for the irregularity of its appearance than this. Till about the middle of the last century, few specimens had been observed; but, about 60 years since, it appeared in such prodigious numbers throughout the kingdom, that the entomologists of that day gave it the appellation of the Grand Surprise. Of late, it has again become unfrequent; the last times, according to Donovan, that it occurred in plenty being 1789 and 1803, a few only having been captured subsequently. At the present day, it still appears to occur occasionally throughout England, as Mr. Backhouse informs me that it has been found repeatedly near Seaton, Durham—and often floating on the river Tees."

DALE, *British Butterflies*, p. 160.

"Stephens, in his *Illustrations*, 1828, writes: 'No insect is more remarkable for the irregularity of its appearance than this. Till about the middle of the last century, few specimens had been observed; but, about 60 years since, it appeared in such prodigious numbers throughout the kingdom, that the entomologists of that day gave it the appellation of the 'Grand Surprise.' Of late, it has again become unfrequent; the last times that it appeared in plenty being 1789 and 1793, a few only having been captured subsequently. At the present day, it still appears to occur occasionally throughout England, as Mr. Backhouse informs me that, about the year 1820, he saw vast numbers strewing the sea-shore at Seaton Carew, Durham, both in a dead and living state, and also floating on the river Tees.'"

Who can compare Mr. Dale's intended verbatim (?) quotation with the original, and say that romance does not exist among those who write Science (with a capital S) for the entomological public? What a wealth of imagination about the "vast numbers" of *Eucanessa antiopa* "strewing the sea shore at Seaton Carew, both in a dead and living state!" How pathetically the bald statement of Stephens appealed to Mr. Dale, a comparison of the italicised portions will show. Whilst the scientific (!) magazines print the communications of these romancers, Mr. Frost need not fear the decadence of entomological fiction.

Truly, I cannot believe Mr. Frost to be much of an entomologist. Had he a deeper knowledge, he would never have penned a large part of his paper. For myself, the humours indulged in by certain writers

who deceive themselves and others (and at the same time amuse a small section of entomologists), have been the only link between me and what some entomologists call Science. Fancy a course of Chapman, Eaton, Verrall, Sharp, Prout, etc., without the rubbish of A—, B—, D—, F—, etc., to help digest it. It's really too awful, or at least our Editors think so.

Description of Lepidopterous Larvæ.

By J. W. TUTT, F.E.S.

Many years ago (*Entomologists' Weekly Intelligence*, vol. viii., p. 81), Stainton complained of the hap-hazard and unsystematic way in which descriptions of larvæ were drawn up, and he laid down, what have subsequently proved very unsatisfactory, rules as to how they might be made more systematic. Among other things he suggested that the head should be called "the 1st segment," the 1st thoracic segment, "the 2nd segment," and so on, until the anal segment of the caterpillar was reached.

It is well known that the head is not one segment, but a segregation of segments forming a complex organ. Whether it is composed of four or more segments is doubtful. As a separate organ it should be described as such, and not as the 1st segment.

The three segments following the head constitute the thorax, and are known as:—(1) The pro-thorax. (2) The meso-thorax. (3) The meta-thorax or post-thorax. The structure and armature of these are generally very different from those of the following segments.

The ten posterior segments are known as the 1st, 2nd, 3rd 9th abdominal, the latter being usually termed the anal segment.

It is almost impossible to unravel what some describers of larvæ wish to convey to their readers. They describe the larva as if it were a piece of wall-paper, up one side and down the other, till they have got to the end of it. They write pages about dorsal, subdorsal, lateral lines, and are very choice in their selection of colour tints, but of the structural peculiarities we learn nothing. How many subsegments there are in the pro-thorax, meso-thorax and meta-thorax; the exact position of the pro-thoracic spiracle; the relation of the tubercles, hairs and spines to the subsegments, are altogether wanting; whilst the differences in structure between the thoracic and abdominal segments are rarely hinted at. We wonder whether there is an atom of scientific value in the descriptions penned by Newman. We can only think of one, that is, to enable the collector to name the larvæ (with doubt). Of course, we understand that only general descriptions can be given in elementary books for youngsters, but in those that aim higher something more is needed.

The larvæ of all our British Pamphilids have white scaly excrescences, which gradually develop under the epidermis during the growth in the last larval skin, and are mature, so to speak, when the larva is quite ready for pupation. These are situated under the sixth and seventh abdominal segments. Zeller describes these as being "on the tenth and eleventh segments," in *Thymelicus actacon*, *T. lineola*, *Pamphila sylvanus* and *P. comma*. This is quoted by Stainton and Barrett. Duponchel says that, in the larva of *P. comma*, they are

"near the bottom of the ninth and tenth segments," and this is quoted by Stainton. Hawes describes them in *T. lincola* as being between "the fourth and the last pair of prolegs," whilst Buckler says that in the larva of *T. thanmus* "a transverse patch of white is situated on the front of the ventral surface of the eleventh and twelfth segments."

The sixth and seventh abdominal segments are thus termed the "tenth and eleventh" by Zeller, Stainton and Barrett, the "ninth and tenth" by Duponchel and Stainton, the "eleventh and twelfth" by Buckler. This is only a single illustration of what is prevalent amongst almost all authors in their descriptions of lepidopterous larvæ.

SCIENTIFIC NOTES AND OBSERVATIONS.

FOOD-PLANT OF THE ERIOCEPHALIDES.—A statement, by Professor Frey, in *The Entom. Annual*, 1858, reads :—"The family of the MICROPTERYGIDÆ, containing the single genus *Micropteryx*, has only eight species that occur in Switzerland. The half of these, *i.e.*, four, have been noticed on the higher Alps, *viz.*, *calthella*, *aruncella*, *allionella* and *anderschella*, often at considerable elevation. Certainly the larvæ live not only in the wood of trees, but also on low bushes and hard-stemmed plants." The species named belong to the genus we now call *Eriocephala*. It is to the suggested food-plants that I would call attention.—J. W. TUTT. *June*, 1896.

ON THE EMERGENCE OF CŒNONYMPHA PAMPHILUS.—Of a brood of *C. pamphilus*, reared from eggs laid last spring (1895), half of the larvæ fed up, pupated, and attained the perfect state the following autumn; the other half hibernated, why, I cannot say, as they were all treated alike. Those that did not feed up were not torpid during the winter, but fed intermittently, and pupated about the 21st of May. The imagines began to appear on June 9th.—S. G. C. RUSSELL, F.E.S., Woking. *June*, 1896.

ON A LARVAL HABIT OF CŒNONYMPHA PAMPHILUS.—The larva of *C. pamphilus* has a curious habit of feigning death when disturbed. It does not curl up, however, but stiffens itself somewhat rigidly.—*IBID.*

CLASSIFICATION OF THE MELALOPHIDÆ.—Having communicated my arrangement of the European species of this family, established by me in the *Systema*, 1895, to Dr. Dyar, the latter has looked over his material, and kindly communicated to me the result. The *Melalophidæ* are Holarctic forms, previously united with the *Ptilodontidæ*. The Synopsis is as follows :—

Fore-wings 12 veined. *Melalophidæ*, Grt., 1895.

a. Thoracic warts (upper three) of larva in line.

1. Primitive first stage absent : *Phalerinæ*, Grt.

(comprising the genera : *Datana*, *Phalera*, *Thaumatopeoa*).

2. Primitive first stage present : *Melalophinæ*, Grt.

(comprising the genera : *Melalopa*, *Pygaera*, *Ichthyura*, *Clostera*).

The synonymy of the latter is not assured. The type of the family and of the genus *Melalopa* is *M. curtula*.

b. Thoracic warts not in line, larvæ very hairy. *Apotelodinae*, N.D.

(comprising the genera : *Apotelodes* and *Parathyris*).

This latter group seems to be American. Dr. Dyar writes me that the European *Pygaera timon* interestingly resembles *Apotelodes*. The

affinity of the latter genus, which has even been placed in the *Geometridae*, seems to be now definitely ascertained. The *Eupterotidae* are not synonymous but distinct by the 11-veined primaries.—A. RADCLIFFE GROTE, M.A., Roemer Museum, Hildesheim.

ON THE PROBABLE FUNCTION OF THE VENTRAL WHITE PATCHES IN ADULT PAMPHILID LARVÆ.—Mr. Barrett, writing of the larva of *Thymelicus actaeon* (*Brit. Lep.*, p. 285) says : —“On the under surface of the tenth and eleventh segments are the usual two snow-white patches, which are said to be of a waxy nature, and the use and function of which is totally unknown.” We presume that Mr. Barrett means the two white scaly excrescences found on the ventral area of the sixth and seventh abdominal segments. Rübl says that in *Pamphila comma* this “snow-white excrescence is somewhat leaf-shaped, thick and viscous. On the application of heat the substance melts like wax, and therewith loses its white colour entirely.” It appears that these are in reality pockets of asbestos-like material, which the larvæ scatter about when spinning their cocoons for pupation. We would suggest that it probably helps to make the cocoons water-tight, a very necessary provision, considering how slender those of the Skipper butterflies always are.—J. W. TUTT. *June*, 1896.

ON THE WING EXPANSION OF *MELITÆA AURINIA*.—On May 31st, at 11 a.m., a female specimen of *Melitæa aurinia*, having, as usual, at the moment of emergence, stained the inside of the anal portion of the pupa with a crimson fluid, emerged from the pupa. I happened to open the lid of the cage the pupæ were kept in, and a small piece of the pupal shell came away attached to the left antenna. This I at once removed. By 11.5, the imago had fixed itself for expansion. By 11.12, the left-hand pair of wings had attained almost full growth, both the fore and hind-wings expanding regularly. The right pair of wings had scarcely expanded at all, and were small and crumpled. By 11.15, the hind-wing of the right-hand pair had grown almost to full size, the fore-wing on the right-hand side being small and much crumpled towards the tip. It then began expanding rapidly, and soon reached the hind-wing, passed it, and by 11.20 had attained its full size. The butterfly then hung motionless for about ten minutes, after which the hanging wings were separated, and each pair bulged out centrally, forming a convex bow on each side. About mid-day the wings were hung perpendicularly, the hind-wings separated somewhat from the fore-wings. At about 12.30, the wings were ready for flight.—J. W. TUTT. *June*, 1896.

ODYNERUS ANTILOPE.—This grand *Odynerus* is very rare here; I am not sure I have seen it here before, though it is not uncommon in Monmouthshire. A few days ago a specimen flew up to a hole in a brick wall close to a window out of which I happened to be looking; she carried a large larva, which she rapidly passed into the hole, following it herself. The whole operation was performed so quickly, that I thought the larva was that of *Pieris rapæ*, but a specimen afterwards obtained was that of a large *Tortrix*, almost certainly *adjunctana* (*forsterana*), full-grown, and rather larger than the *Odynerus*, and no doubt the other was the same. She carried it by holding it in her jaws by about the 2nd or 3rd segment, and the further portion held by her legs under and parallel to her body. She pushed the head of the larva into the hole, seating herself at the same time outside, retreating

so as to seize the larva in her jaws about the middle, again pushing it further into the hole, and seizing it again near the terminal segments, pushing it right in, and then following it. The legs assisted in the process, and the whole appearance was that of passing the larva on from hand to hand, as a row of men might do, but done too rapidly to enable one to notice the details. But the way in which the hole was used to steady the front of the larva, and direct its course when pushed on from the middle and behind, in a way quite foreign to the relative positions of wasp and victim on arrival, evinced engineering skill of a high order.—T. A. CHAPMAN, M.D., F.E.S., Hereford. *June 13th, 1896.*

VARIATION.

LEUCANIA PALLENS AB. ECTYPA.—Mr. Barrett (*E.M.M.*, p. 99) describes a form of *Leucania pallens*, in which the red fore-wings have no fine white longitudinal lines, and states that "this variety of *Leucania pallens* seems to agree with what Hübner called *L. ectypa*." Mr. Barrett could hardly have compared this with Hübner's figure, which is particularly characterised by the presence of these white lines. "Hübner's fig. 231 has the anterior wings of a bright reddish ochreous, with pale nervures, no central dot, two dots in outer row, one just below the third branch of the median nervure. Hind-wings whitish-grey, with a dark grey shade parallel to the hind margin. Dr. Staudinger describes it as:—'Alæ anteriores rufæ.' I have many specimens in my long series almost like Hübner's figure. The development of the grey shade on the hind margin into a transverse band is rarely very distinct in British examples. This is treated by Guenée as a distinct species in his *Noctuelites*, p. 94. I have specimens from Howth, Deal, Aberdeen, Rotherham, Strood and Forres" (*British Noctuae and their Varieties*, vol. i., p. 41).—J. W. TUTT. *June, 1896.*

SYRICHTHUS MALVÆ AB. TARAS.—I took, near here, on the 13th inst., a specimen of *Syrichthus malvæ* ab. *taras*, in fine condition, which variety is, I believe, rather rare in England. I have compared it with specimens from the Continent, and it appears to tally accurately as regards markings, although the spots are perhaps hardly so confluent as in the foreigners. Butterflies have been very abundant round here this spring.—FREDK. C. LEMANN, F.E.S., Black Friars House, Plymouth.

VARIATION IN WHAT HAS HITHERTO BEEN CONSIDERED A CRITICAL MARK OF DISTINCTION BETWEEN *TRILENA TRIDENS* AND *T. PSI*.—A short time ago Mr. Tutt asked me to ascertain the value of the direct continuation of the Ψ at the anal angle into a dark line of the fringe, as a character of *Acronycta tridens*, or, as I suppose we are now to call it, *Triæna tridens*. With this object I wrote to a good many lepidopterists, so as to ensure a sufficient number of reliable data, asking them to examine their series, and I must take this opportunity of thanking them for their kind assistance.

An examination of the tables thus collected gives the following results. Out of 447 bred specimens of *T. tridens*, 359 or 80·3 per cent. have the line continuous. Out of 156 bred specimens of *T. psi*, 116 or 74·3 per cent. have the line interrupted. The tables of both insects, not bred (some admittedly open to question as to species), give fairly similar results; thus, out of 84 captured *T. tridens*, 57 or 67·8 per cent.

showed the line continuous, and out of 145 captured *T. psi*, 103 or 71 per cent. showed the line interrupted. There seems, therefore, an undoubted general tendency to the direct continuation of the line in *T. tridens*, and to its interruption in *T. psi*, but the character is not sufficiently stable to be of much practical use, except so far as it may add to its weight by accumulation to other characters already more or less relied on, in attempting to distinguish the two imagines.

A few points of interest were brought out in the enquiry. Both Dr. Chapman and Mr. Banks called my attention to the asymmetry of the character in a few individuals. Mr. Mera's series of 51 bred *T. tridens*, Mr. Horne's of 22, and my own of 13, in which each individual shows the continuous line, may point to the stability of the character in certain broods or perhaps localities. Mr. Prout and others notice the continuation of the line in var. *suffusa* of *T. psi* of the London district. From its melanism it is difficult to recognise any interruption, but I can detect a trace of it in one specimen in my cabinet.

The following is the summarised table of the results:—

In the collection of	T. tridens.				T. psi.			
	bred (447)		not bred (84)		bred (156)		nt. bred. (145)	
	line continuous.	line interrupted.	line continuous.	line interrupted.	line continuous.	line interrupted.	line continuous.	line interrupted.
Mr. Banks ...	5	5	5	3	0	1	6 1	10 5
	5, asymmetrical not included.		(not certainly bred.)				doubtful whether bred or caught. 1 asymmetrical, not included.	
Mr. Bright ...	0	0	10	8	0	0	5	14
Dr. Chapman ...	158	41	0	0	12	52	0	0
Mr. Wm. Hewett ...	2	0	0	0	0	0	7	10
Mr. Horne ...	22	0	0	0	0	10	1	10
Mr. Maddison ...	19	5	0	0	7	3	4	0
Mr. Mera ...	54	0	0	0	8	17	0	4
Mr. Prout ...	4	0	1	0	0	3	8	11
							6=var. suffusa	
Mr. N. Richardson	22	4	0	0	4	6	0	0
Dr. Riding ...	13	0	0	0	0	0	2	17
Major Robertson ...	10	3	0	0	0	0	6	9
							(some bred, but not known which)	
Mr. Turner } per Mr. Page }	0	0	0	0	6	6	2	0
Mr. Tutt ...	41	27	23	6	—	—	—	—
Mr. S. Webb ...	8	3	9	5	3	18	0	0
Mr. Young ...	1	0	9	5	0	0	0	13
	359	88	57	27	40	116	42	103
	or		or			or		or
	80·3%		67·8%			74·3%		71%

VARIATION OF *OPORABIA DILUTATA*.—For some time I have been setting aside such specimens of *Oporabia dilutata* as came in my way, and I find that most of the specimens that I have taken near Glasgow are of a more or less unicolorous grey, the hind-wing being lighter than the fore-wings, which have just a slight indication of marking, although the bands in some specimens can be followed. I have a number of specimens from the Paisley district which are rather remarkable, reminding one of the specimens of *Hypsipetes sordidata*, with a pale band across the centre of the wings, the remainder of the wings being of a dark-grey colour, with the base lighter. I have a few specimens from the high moorland ground (Lead Hills and Wenclochhead), which do not differ much from those taken in the lower woodlands near Glasgow, except that there are a few dark (almost black) markings along the costa, and extending inwards along the central bands.—J. J. F. X. KING, F.E.S., 207, Sauchiehall Street, Glasgow. *June, 1896.*

Oporabia dilutata is very common here (Castle Moreton) and can sometimes be obtained in great abundance by beating the boughs of trees during the daytime. Two forms (1) a dark grey, and (2) a pale grey, with more distinct markings, are about equally abundant, and I have also one specimen very pale indeed, and the markings more distinct than in any other specimens. It approximates in markings very closely to Plate III., fig. 1 (*Ent. Rev.*, vol. vii.).—(Rev.) E. C. DOBRÉE FOX, M.A., Castle Moreton, Tewkesbury. *June, 1896.*

CURRENT NOTES.

The "Power Collection" has been acquired by the Trustees of the British Museum. It consists of about 30,000 specimens of British Coleoptera, and about 5,000 specimens of Hemiptera.

Mr. J. J. Walker, of 23, Ranelagh Road, Sheerness, on the evening of May 14th, found, on the foreshore of the Isle of Sheppey, a number of *Pogonius littoralis* and *P. luridipennis* running rapidly over the bare mud, or, wherever a little moisture was to be found, sitting in vertical burrows about half-an-inch deep, each beetle with its head just at the level of the soil, the earth being thrown out round the mouth of the burrow in a granular form, as by a sandhopper or a *Bledius*, only much more regularly. He has specimens of *P. luridipennis* to spare for friends (*P.M.M.*).

Mr. Chitty records a specimen of *Quedius riparius*, taken by himself in September, 1893, in flood refuse from the river Beaully, Inverness, N.B., in the neighbourhood of Beaully Castle.

Dr. Sharp (*P.M.M.*) states that the rudiments of the wings of the butterfly can be found in the interior of the body of the caterpillar, and Verson has recently stated that he has found them in the embryo caterpillar some days before the young silkworm leaves the egg, when it consists of a few cells in close propinquity with a tracheal branch, placed on the interior of the wall of the body on the second and third thoracic segments. Further growth develops a projection into the interior of the body, and as the cells increase the tracheæ multiply and assume a complex form, so that branches of minute, rolled-up, tracheæ are found in the wing-rudiments. When the quiescent stage preceding pupation is reached, the wings disappear from the interior of the body, and, if the outer layer of the cuticle

be stripped off, they will be found immediately under it, so that when the skin is cast off, the wings are visible on the exterior of the body. A rapid increase of size (especially of length) occurs when the wing becomes an external organ, and at the moment the caterpillar skin is cast and the chrysalis revealed, the bundles of minute tracheæ are torn out. In the chrysalis, large tracheæ are found in the imperfect wings; these subsequently disappear, and it would appear that no tracheæ can be found in the mature wing. The scales that cover the wing are formed before the wing-membrane, on which they are subsequently implanted, exists.

Dr. Sharp points out, that although the tracheæ in the pupal wings have much the same arrangement as the nervures in the imagines, the tracheæ are not changed into nervures; but that the latter probably have their origin from string-like structures, which run near the tracheæ, called "Semper's rods."

When the imaginal wing has expanded, the sides of the bag from which it was formed become adherent by dried matter with a somewhat pillar-like arrangement. This is considered as probably refuse material, which cannot be utilised otherwise by the perfect insect.

The ♀ of *Cheimatobia brumata* has been found *in copulâ* on lamps at some distance from the ground (*Ent. Rec.*, vol. vi., p. 92 and p. 159); it has been, therefore, assumed that the male carries her there. It has been shown by competent observers (*Ibid.*, p. 159) that, when the male and female of this species are *in copulâ*, it is the female that drags the male about, and not *vice versa*. Mr. Finlay states that the idea of the male carrying the female has been repeatedly stated "in horticultural journals and newspapers," but that he disbelieves it, and probably no man in Britain is better able to give a practical opinion. This is supported by Mr. J. Mason (*Ibid.*, p. 263), another practical man. Quite recently, Mr. W. F. H. Blandford exhibited at the meeting of the Ent. Soc. of London a grease-band covered with the wingless females of *C. brumata*. Mr. Arkle now assumes that the males do carry females in sufficient numbers "to affect their distribution," and agrees with a correspondent of the *Standard*, that "grease-bands are of no use at all." He further states that "the activity of Geometers by night is well known to be limited." At which most entomologists will be amused.

Mr. Lucas, writing from Brisbane, Australia, states that he was recently surprised at "a countryside home, in Australia, to see a store-box full of *Euranessa antiopa*. The owner told him that "in the old country he had done well by them. He first of all imported ova from America in hollow pieces of cane. These were duly hatched and reared. Part were turned loose in the imago, others kept for trade. Thus the specimens were bred on English soil! I remember one year 400 being the recorded number seen or captured in England."

Mr. Eustace Banks (*Ent.*, June) gives some remarks on the "Additions to the British Lepidoptera during the past ten years." He strikes out *Sesia conopiformis*, *Hereyna phrygæalis*, *Melissoblyptus gularis*, *Acrolepia assectella* and *Argyresthia illuminatella*. He states that *Nepticula gei*, Wk., sinks before *N. fragariella*, Heyd., and that *Retinia retiferana* is referable to Wocke, and not to Heinemann.

Figures of *Panchlora madeiræ*, Fab., an insect probably imported in cases of bananas, are given in *The Entomologist*.

In a paper on "Fungi parasitic on Butterflies," by Mr. Rickard, are some remarkable statements as to the occurrence of microscopic fungi among the scales of White (and other) butterflies. These are not to be found among the females, but are to be detected on the male wings of *Pieris brassicae*, *P. rapae*, *P. napi*, *P. daphidice* and *Euchloë cardamines*; whilst "several South African butterflies have similar parasites," and he gives a large number of cases of similar fungi as occurring in the males of various Satyrids and Lycaenids, and considers that "the parent forms of the fungi will probably be found, in a degraded state, on the food-plants of the various butterfly larvæ," and that "all the fungi hitherto noticed appear to belong to Berkeley's *Gasteromyces*, a rather high order of the class;" whilst the Editor of the *Entomologist* understands that Mr. Rickard has continued his investigations of these butterfly "fungi," with the result that his original conclusions are confirmed. He writes: "As a matter of fact, I am cultivating the spores between glass-slips; some have already germinated!" Now, when a man describes "fungi" from specimens of *Pieris agathina* (1) that have been "dead some five or six and twenty years," (2) when he finds that fungi are confined to the scales of one sex, (3) when he cultivates such fungi as these on glass-slips, one rather wonders what has happened. We would seriously suggest that Mr. Rickard's fungi are simply the *androconia* of the male insects, and not fungi at all. We await the "cultivation" experiments with expectation.

NOTES ON COLLECTING, Etc.

REFLECTIONS AND QUERIES ON THE VALUE OF RARE BRITISH LEPIDOPTERA.—Referring to the criticism under the above title (*ante*, p. 67), I was quite aware that in the mists of antiquity one specimen of *Diasemia ramburialis* was reported as captured by Mr. Thomas Boyd. I was further aware that *Ebulea catalaunalis* was also introduced into the British fauna on the strength of a specimen reported as captured by Mr. C. W. Boyd; in fact, the strange coincidence that two gentlemen of the same name should capture the specimens by which two such rare species were introduced was the point that struck me as peculiar, but I did not know anything of these gentlemen whom your correspondent champions so strongly. I had quite overlooked Mr. Digby's record of the former species, or should have been more guarded in my offhand remarks (at least as to the specimen he captured). At the outside, then, so far as "A Country Cousin" shows us, there are two *bona fide* British captures of *D. ramburialis* recorded, and one of *E. catalaunalis*. Now, this being so, it is the publication of a list of localities like that in Leech's *British Pyralides* that puzzles me. Where did Leech get the localities, "Lewes, Folkestone, Dover, Cornwall," for *D. ramburialis*, from? Evidently, with the exception of Cornwall, not from the magazines, and if "near London" is intended for "Cheshunt," who captured *E. catalaunalis* "near Dover?" But "A Country Cousin" knows that dozens of reputed British specimens have gone through the sale rooms during the last 20 years. So far, he has shown us that the British authenticity of these species rests fairly on two and one specimen respectively. Meyrick says of *E. catalaunalis*, "Kent, a rare immigrant only; S. Europe, S. Asia, Malay Archipelago;" of *D. ramburialis*, "Kent to Cornwall, very

local, perhaps not resident; S. Europe, S. Asia, Africa, Australia, N. America." These distributions will give an idea of the unlikelihood of either species being a resident native, in sufficient quantities to supply the demand. Those who own the "Boyd" and "Digby" specimens had better keep them intact; of others in collections I should like to hear further.

"A Country Cousin" appears to know a great deal more of "sale-room" nomenclature than I can lay claim to. There is nothing in the catalogue of the sale to show that "Warren" = "Waring," and we who are not behind the scenes could not be expected to guess it. At any rate, that does not affect my question—Why did the *Mecyna polygonalis* in Tugwell's collection produce 95/- and 63/- each, and the "fine" *M. polygonalis* from "Waring's" (Warren's) collection only 16/- (with 215 other specimens added)?

I am quite willing to own that I deserve my critic's censure *re* *Hadena peregrina*. I see, on reference to Mr. Tutt's *British Noctuae*, etc., vol. iii., p. 82, that Mr. Bond only took one (September, 1875), and "that a second specimen (probably Mr. McLachlan's) was afterwards captured in the same locality."

I am not so satisfied as to his remarks about *Ophiodes lunaris*. I am not like Mr. Harold Hodge, opposed to the professional collector *per se*, but he should be above suspicion, and no professional collector who sells *O. lunaris*, and equally rare species, without recording such, can be above suspicion, and there is just a taint of sarcasm in the suggestion that a certain collector has probably not recorded his rare captures because "he can get as good a price for them," as, I suppose, he could if he published records of them.

I cordially re-echo your correspondent's regrets that our professional collectors neglect to give us, if not "the benefits of their experience," the scientific observations they have made. The professional entomologists on the Continent are usually among the most scientific entomologists of their respective countries. Herein lies the gulf between them and our own professional collectors, whose sole aim, judged by their publications, is not science but pence.—JOHN BULL.

KENTISH CHRYSOPHANTUS DISPAR.—With regard to the specimens of this species, reported as taken in Kent, at a meeting of the South London Entomological Society (*ante*, p. 62), I would point out that there were two or three in Tugwell's collection, which were labelled in cabinet, and catalogued as "taken by Mr. Freeman, Say and Seal Park." I did not see the undersides, but they were very small for *C. dispar*, and, judging from the upper sides only, I should have pronounced them var. *rutilus*. They certainly were not larger than types of that form (I am speaking from memory only), and the prices realised, 45/-, 55/-, and 63/- only, are very low for good examples, which they were, and seem to corroborate my supposition. I do not know who bought them.—W. G. SHELDON, Croydon. May 29th, 1896.

DRYMONIA CHAONIA AND PROCRIS STATICES IN CO. CORK.—I have taken, during this month, two specimens of *D. chaonia* near Mallow, Co. Cork, Ireland, also *Procris statices* (common enough here), but the date (May 25th) appears to be early.—C. BINGHAM NEWLAND, Killebra, Mallow, Co. Cork. May 27th, 1896.

ERRATIC EMERGENCES: MELANIPPE FLUCTUATA AND EUCHLOË CARDAMINES.—To show how erratic the emergence of *M. fluctuata* may be

(*ante*, p. 57), I may say that I took an odd specimen on January 1st, this year, on a wall at Streatham, evidently just emerged. I was informed by the keeper that a specimen of *Euchloë cardamines* was observed in Chattenden Woods on February 29th.—H. TUNALEY, F.E.S., 30, Fairmount Road, Brixton Hill, S.W.

APAMEA OPHIOGRAMMA.—It is like a dream to find *A. ophiogramma* turning up after being a rarity for so long. Fifty years ago a Mr. Fred. Grant, of Battersea, took an immense number in his garden. Of these he gave a large number to Sam Carter, of Manchester, and myself, just before he went to New Zealand.—J. B. HODGKINSON, F.E.S. *June*, 1896.

CHIRYSOPHANUS DISPAR NOT IN THE DUCHESS OF PORTLAND'S SALE.—In reply to your footnote (*ante*, p. 57), I cannot find any mention of the insect referred to being included in the Duchess of Portland's sale.—J. E. P. DAVIES, Church House, Kington, Herefordshire. *June*, 1896.

TRIP TO EPPING FOREST.—The North London Natural History Society had a field excursion to Epping Forest on May 16th. The party travelled by the 2.32 p.m. train from Liverpool Street to Chingford, and then walked straight across the plain, and struck the fields to the left of the "Woodman," where *Ino staticeæ* sometimes occurs in profusion. As it was, only a few *Euclidia mi* and *Emmelesia albulata* were taken; and larva-beating did not pay much better, though a couple of nests of *Bombix neustria* were turned up by Mr. Bacot, and the commoner larvæ were about in their usual numbers. The members took a long walk round into the High Beech fields, and thence made their way to the "Robin Hood," where the sole piece of excitement of the day occurred, in the shape of a specimen of *Bombix rubi* flying along the Loughton Road at full speed, which induced a corresponding proceeding on the part of Mr. Battley, who, however, failed to catch it. After this effort the members had tea, and then dispersed into the forest, walking slowly back to Chingford in various groups. Dusking was quite a failure. The larvæ of *Pseudoterpna pruinata* were taken in some numbers on the Petty-whin after tea.—LAWRENCE J. TREMAYNE, *Hon. Sec.*

NOTES ON LIFE-HISTORIES, LARVÆ, &c.

BROTOLOMIA METICULOSA.—I have often bred *B. meticulosa* in the spring, but I think the larvæ and pupæ have generally been in warmer quarters than natural. Once I remember finding a recently emerged imago in a cold greenhouse during one of the early months of the year.—W. S. RIDING, M.D., F.E.S., Buckereil, E. Devon. *June*, 1896.

I received some larvæ of *B. meticulosa* in January, from a friend in Bordighera, which emerged on April 1st last. I also took a ♀ here (near Weymouth) on May 9th, which has been laying quantities of eggs.—N. M. RICHARDSON, B.A., F.E.S., Monte Video, nr. Weymouth. *June*, 1896.

Some 20 years ago I used to get the full-fed larvæ of *B. meticulosa* spun up in winter cocoons, among the mortar and loose rubbish between the bricks forming the wall of a garden, in Strood (Kent). They used to remain in this condition for some time without pupating, but, once pupation took place, emergence rapidly followed. As

pupation was usually very irregular, emergence was also.—J. W. TUTT.

PUPATION OF *APAMEA OPHIOGRAMMA*.—Referring to Mr. Burrows' notes on *Apamea ophiogramma*, I find a large proportion of my larvæ have pupated in the dead stems of last year's grass, about two or three inches above ground.—W. B. THORNHILL, Castle Cosey, Castle Bellingham. *June 2nd, 1896.*

PRACTICAL HINTS.

Field Work for June and July.

By J. W. TUTT, F.E.S.

1.—During July the flowers of common centaury (*Erythraea centaurea*) should be gathered for larvæ of *Mimaescoptilus zophodactylus*.

2.—In July, at Tuddenham, examine the heads of *Sisymbrium*, which are just seeding. Many of the apparent seed-pods will be found to be full-grown larvæ of *Lithostege griseata*.

3.—The banks by the sides of the roads at the same time and place will give a plentiful supply of larvæ of *Heraterra serena* and *Dianthoeccia irregularis*. If the latter is not to be swept, search carefully at the roots of *Silene otites*, the food-plant, scraping the earth away gently with the fingers, and the larvæ will be found hiding during the day.

4.—Towards the end of July and early in August the larva of *Eupithecia campanulata* is to be obtained by knocking the plants of the nettle-leaved bell-flower (*Campanula trachelium*) against the sides of an open umbrella. The larvæ feed in the seed-capsules. In confinement they will feed upon garden species of *Campanula*. In some localities almost every dry corolla-tube contains one or more larvæ.

5.—At the end of July the full-fed larvæ of *Gracilaria omissella* blister the leaves of *Artemisia*. The moths usually emerge about three weeks later.

6.—The larva of *Emmelsia decolorata* is to be obtained by collecting the capsules of *Lychuis dioica* in July.

7.—The tops of the shoots of *Euphorbia amygdaloides* should be collected in July, if the central leaves be spun together. The larva of *Sericoris euphorbianæ* lives within, and bores down the stem some distance. The pieces picked off should therefore be of good length.

8.—Collect capsules of *Silene* in July for larvæ of *Eupithecia renosata*. Seed-heads (unripe capsules) of *Linaria vulgaris* in July and August contain larvæ of *E. linariata*. Flowers of *Digitalis purpurea* (foxglove) in July contain larvæ of *E. pulchellata*. Flowers of *Valeriana officinalis* succour larvæ of *E. valerianata* in July. Seed-pods and flowers of *Melampyrum pratense* in July and August produce *E. plumbeolata*.

9.—Towards the end of July examine bedstraw (*Galium*) from 10 p.m. to 12 midnight with a lantern. By this means the larvæ of *Choerocampa porcellus* can often be found in considerable numbers.

10.—Towards the latter end of July, and throughout August, *Eremobia ochroleuca* loves to sit in the centre of a flower of *Centaurea scabiosa* (or *C. nigra*) in the afternoon sunshine.

11.—Beat larch towards the end of July for full-fed larvæ of *Eupithecia lariciata*.

12.—In July the bushes of *Cornus sanguinea* should be searched for mines of the larvæ of *Antispila pfeifferella*.

13.—During the last week in July search should be made for small aborted cones of common spruce fir and *Abies douglasii*. The aborted cone usually forms one of a bunch of three or four, the others being well developed. These will be found to contain larvæ of *Euzophera* (*Cateremna*) *terebrella*.

14.—Towards the end of July the larvæ of *Banksia argentula* can be obtained by shaking the high grass stems—*Poa annua*, *Poa aquatica*, *Poa pratensis*, etc.—over a sheet of white paper.

15.—The last few days of July, and the first week of August, should be spent in looking over the seed-heads of *Jasione montana*. The reddish larvæ of *Eupoecilia pallidana* feed within.

16.—At the end of July the larva of *Echmia dentella* is to be found spinning together, with a slight web, the seed-heads of *Chaerophyllum temulentum*. It feeds on the seeds.

17.—The cases of *Coleophora flaraginella* are to be found during July and August on the leaves, flowers and fruits of *Suaeda maritima*.

18.—The larvæ of *Agrotera nemoralis* feed on *Carpinus betulus* during July, living in a loosely-spun web on the underside of the leaves.

19.—During the last week in July, the berries of *Rhamnus frangula* are sometimes found fastened together with silk. The larvæ of *Eupoecilia ambiguana* clear out the berries after thus spinning them together.

20.—In July and September the white patches formed by the larvæ of *Botys asinalis* on the dark green leaves of *Rubia peregrina* are very conspicuous.

21.—The larvæ of *Nepticula betulicolella* feed in early July, in small contorted galleries, in birch, filled with brown excrement.

22.—The larvæ of *Depressaria capreolella* are to be found in early July on *Pimpinella saxifraga*, not in radical leaves, but high up the stems.

23.—At the end of July the larva of *Tinagma resplendellum* mines in the leaves of alder, making blotches.

24.—The larva of *Peronea permutana* feeds in bound-together leaves of *Rosa spinosissima*, generally on the lateral shoots, in June, July and August. It occurs at Wallasey and Penmanbach (near Conway).

25.—Messrs. Webb and Jeffrey were in search of Lepidoptera, in Kent, on a wild gusty day in July, 1878, when they turned their attention to the bored stems of the yellow flag (*Iris pseudo-acorus*). The result was the addition of *Nonapria sparganii* to the British list. The familiar green larva was found in the summer of 1879, in bur-reed (*Sparganium ramosum*). The insect probably occurs in all the marshes from Deal and Sandwich to Hythe.

26.—The heads of *Centaurea scabiosa* should be collected during July for larvæ and pupæ of *Onchylis gigantana*. Very abundant on cliffs near Dover.

27.—In early July the imagines of *Tapinostola clymi* may be shaken out of the plants of the sand-reed (*Elymus arenarius*) during the day-time, but are much more readily obtained resting on it by night.

28.—“The last fortnight in July was spent at Lowestoft, when I went out mothing every night with a lantern, to the low marshy

ground just at the back of our lodgings. I set eighteen dozen insects, for they swarmed from nine to ten o'clock, so as to make the rushes (*Juncus effusus*) look full of various coloured flowers. I could have taken hundreds every evening, for they sat perfectly still, extracting something from the heads of these rushes—then past flowering, and all I had to do was to make a selection and box all I wished for" (Skepper).

29.—Refer to *Ent. Rec.*, vol. i., p. 117, for a series of "Practical Hints" as to "Field work in July," by Mr. W. H. Tugwell.

SOCIETIES.

CITY OF LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.

—May 19th, 1896.—Exhibits:—Mr. Tutt: BUTTERFLIES BRED FROM PUPÆ WHICH HAD BEEN SUBJECTED TO DIFFERENT TEMPERATURES, and read the following notes by Mr. Merrifield:—"GONEPTERYX RHAMNI. The specimens are divided into two batches. (1) The pupæ of the first batch were subjected to high temperature. These show an increase of yellow scales in the female, probably caused by temperature, but not enough individuals were bred to be certain that this was so. (2) The pupæ of the second batch were subjected to low temperature. These specimens show a reduction of the orange spot on the disc of the fore-wings. This resembles var. *farinosa* and var. *nepalensis*. PYRAMEIS ATALANTA. (1) The pupæ of the first batch were subjected to high temperature. The result is a broadening of the scarlet band, which is also very bright in tint; whilst scarlet clouds and patches appear on parts of the wing, ordinarily black. On the underside the forced specimens are seen to have somewhat pale areas. On the costa and outer margin of the hind-wings, these pallid areas are much increased in the imagines from cooled pupæ. (2) The pupæ of the second lot, which I have sent for comparison, were subjected to low temperature. These have the scarlet band narrowed, and broken by dark nervures; they are also of a much duller tint, whilst the white markings are much increased. AGLAIS URVICE. (1) Some specimens of true *A. urticae* var. *ichnusa*, from Southern Europe, of an exceedingly bright hue, but with the three well-developed discal spots of the type obsolete. An ordinary British specimen of the same species, for comparison. (2) Specimens bred from English pupæ, which have been subjected to high temperature. These exhibit a tendency (a) for the three (discal) spots to disappear; (b) for the colour to become brick-red and increase its area, especially near base of hind-wings; (c) for the outer border to become narrow, tapering towards the anal angle of the fore-wings; (d) to light colour of outer border; (e) for the wings to be less angulated. (3) Some examples, the pupæ of which were exposed to low temperatures, for comparison. These are also British examples, part from a brood of ordinary English specimens; but one or two, probably Scotch, from a brood slightly darker than ordinary English specimens. It will be observed that these are all very dark, the area of the red colour very much restricted, and the discal spots much increased in size. It will be observed that the high temperature specimens show some approach to var. *ichnusa*, although not exactly the same. The low temperature examples show some approach to var. *polaris*. EUVANESSA ANTIOPA.

(1) Normal form. (2) Specimens from pupæ exposed to low temperature. These exhibit a narrowing of the pale border, a darkening of the border by the increase in the number of minute black dots, an increase in the size of the blue spots."

Mr. D. C. Bate read the following notes on the LARVA OF *ORGYIA ANTIQUA*. This larva (which at hatching is, as far as I can see, indistinguishable from either *Psilura monacha* or *Oenocria dispar*), at its first change of skin develops the four paint-brush tufts of hair on its back, but all black; the tail tuft is very small and indistinct, as also are the "ear tufts." At the second change the paint-brush tufts are the first two, black, and the second two, white; whilst at the third change the whole are white tipped with pink. At the second change the tail- and ear-tufts are fully developed. I show these three stages; but all my larvæ having passed the first, I am unable to show that stage. [For notes on the moults of the larva of *O. antiqua*, vide, *E.M.M.*, xxiii., pp. 224-227 and p. 274.—Ed.].

Messrs. Bacot, Nicholson and Bayne exhibited their series of the GENUS *HIBERNIA* to illustrate a paper on that group, read by the latter gentleman. Mr. Tutt directed the members' attention to the fact, that the HYBERNATING STAGE was certainly known in the case of every BRITISH SPECIES OF BUTTERFLY, with the exception of *Lycaena arion* and *Thymelicus thaumas*, which he, therefore, recommended to their notice. He stated that *Callophrys rubi* had been unusually abundant at Folkestone, where it had been found to feed on *Suncistus* (*Helianthemum vulgare*). He further stated that Dr. Chapman and himself had seen what they believed to be a SPECIMEN OF *ORGYIA ANTIQUA*, flying in the sunshine, on the 7th of April, near Hereford. Mr. Bayne remarked that LEPIDOPTERA in general seemed scarce in THE NEW FOREST, where he had noticed *Pararge egeria* on the wing, at Easter. He and other members agreed that butterflies were not at all common at Epping Forest; but Mr. Bacot had found *Euchloë cardamines*, and the usual "Vanessas," common at Hatfield and Lambourne End.

June 2nd, 1896.—Exhibits.—Mr. Bacot exhibited SPECIMENS OF *TRYPHÆNA ORBONA* (COMES), bred from ova laid by 2 ♀s taken at Sandown last September. The larvæ fed up during the winter on cabbage, carrot, etc., and the moths emerged during January, February and March. As the larvæ got mixed, he was unable now to separate them into the two broods, which was unfortunate, as the variation was considerable. The ♀s were too worn to be worth keeping, but so far as he could remember, there was nothing very remarkable about them; also, *Tryphaena janthina*, bred from a ♀ taken at Sandown. Mr. Bate: a SPECIMEN OF *SMERINTHUS TILIE*, having the right fore-wing somewhat malformed, and without the usual dark central blotches; the whitish apical mark was larger and more indistinct than that on the left fore-wing, which was normal. Mr. Bate also exhibited LEAVES OF A LIME (?) TREE, growing in the grounds of Sir H. Bessemer, at Dulwich; this tree always produces abnormally large leaves, sometimes even larger than those exhibited, which were about 9 inches in diameter. Mr. Tutt exhibited LIVING PUPE OF *EPINEPHELE IANIRA* AND *ENODIA HYPERANTHUS*, and drew attention to the difference in their structure, especially with regard to the abbreviated nose-horns of *E. hyperanthus*, and the absence of cremastral hooks in the latter species, showing that

it was impossible for the pupa of this insect to suspend itself. He further drew attention to the way in which *E. ianira* was suspended by means of the larval skin, and not directly by the cremastral attachment, the cremaster of the pupa being fastened within the shed larval skin, the latter being suspended from the spun silken anal pad. He also exhibited LIVING PUPÆ OF *THECLA PRUNI*, and drew attention to the remarkable similarity that it bore to a bird's dropping, and to the fact that it was well suspended, both by an anal pad and silken girth. Mr. Sauzé: VARIOUS SPECIES, including *Ledra aurita*, *Raphidia ophiopsis* (the Snake Fly) and *Hippobosca equina* (the Forest Fly) from the New Forest. Mr. Tremayne recorded a male specimen of *EUCHLOË CARDAMINES* IN THE HEART OF LONDON. It had been observed flying the same afternoon as the meeting, near the railway bridge at the end of Queen Victoria Street. Attention was drawn to the DEFOLIATION OF THE OAK (AND OTHER) TREES in various parts of the country, and it was elicited that the larvæ of *Hybernia defoliaria*, *H. marginaria* and *H. aurantiaria* were excessively abundant in many localities this year, although the larvæ of *Tortrix viridana*, *Cheimatobia brumata*, *Phigalia pedaria*, and even *Asteroscopus sphinx* and *Nyssia hispidaria* helped in the work of devastation.

NORTH LONDON ENTOMOLOGICAL SOCIETY.—May 14th, 1896.—Exhibits: A discussion ON REARING *SPILOSOMA URTICÆ* elicited the fact that the pupa of this species required an unusual amount of moisture. The COLLECTING NOTES, contributed by members, included the capture of *Drepana binaria*, in Epping Forest, flying in the sun, recorded by Mr. Harvey, and the observation that *Clostera pigra* had been seen flying in the afternoon sunshine (at half-past four), by Mr. Prout. Mr. L. J. Tremayne opened a discussion on "TERMITES." These, he said, were NEUROPTERA. They had been known to travellers for a very long time, there being a possible reference to them in Herodotus. But our information about them was still very incomplete, and discussion as to their modifications was still rife among many. He gave a short account of some of the more prominent habits of these creatures, referring principally to *T. bellicosus*, and concluded with a reference to Drummond's theory, viz., that the Termite replaced the earthworm in the tropics as a tiller of the soil. On May 28th, members gave further notes of the COLLECTING EXPEDITIONS they had carried out at Whitsuntide. Mr. Simes, on May 23rd, at Epping Forest, had seen *Chrysophanus phlocas*, larva of *Odontestis potatoria*, ova of *Euchloë cardamines*, and imagines of *Drepana binaria* (*hamula*), *D. vultraria*, *Eubolia plumbaria*, *Panagra petrvria*, *Nisoniades tages* and *Syrichthus malrae*, but had noticed no Fritillaries. On May 24th, at Thames Ditton, he had seen the ova of *Euchloë cardamines* on *Erysimum alliaris*, *Sisymbrium cannabina*, and *Cardamine pratense*, and had also noticed *Anaitis plagiata*, *Pararge megera*, and a specimen of *E. cardamines* ab. *turritis*. On May 25th, at Ripley, he had seen *Brenthis euphrosyne*, *Cupido minima*, *Polyommatus bellargus*, *P. icarus*, *Euchelia jacobaeae*, *Euclidia glyphica*, *E. ni*, *Strenia clathrata*, and larvæ of *Cucullia verbasci*, but no *Nemeobius lucina*. Mr. Prout gave an account of the collecting in Epping Forest. He had taken the larvæ of *Asteroscopus sphinx* off buckthorn, and a specimen of *Dicranura furcula* on a tree-trunk, about 8.30, and the larvæ of *Trichiura crataegi* were again turning up commonly.

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The Gradual Decadence of *Lycaena arion*.

By J. W. TUTT, F.E.S.

Some collectors tell us that our local butterflies are becoming rarer each year, because the seasons have recently been so unfavourable. Such forget that most of the species of British butterflies have been cut off from the Continent for several thousand years, that unfavourable seasons have recurred again and again, that such insects as *Chrysophanus dispar* and *Lycaena arion* were abundant sixty years ago, and that their extermination is a very recent matter, and requires explanation. We do not wish to suggest that unfavourable climatic conditions do not influence insect life, we know that they do; but we do suggest that unfavourable climatic conditions, which have allowed an insect like *Lycaena arion* to exist in tolerable abundance for many thousands of years, did not rapidly exterminate it, say at Barnwell Wold in the "fifties," at Bolt Tail in the "sixties," in certain parts of the Cotswolds in the "seventies," and leave it all this time in comparative abundance in its retired haunts in Cornwall; and we further suggest that this particular species was exterminated in its old quarters, in regular order, as its haunts became known to, and regularly visited by, collectors.

The history of this species in Britain will, we doubt not, be interesting to those entomologists to whom libraries containing the works of old authors are not readily available.

Lewin (*History of British Insects*, 1795) writes:—"This species is but rarely met with in England. It is on the wing in the middle of July, on high chalky lands, in different parts of the kingdom, having been taken on Dover Cliffs, Marlborough Downs, the hills near Bath, and Clifden in Buckinghamshire." Donovan (*Natural History of British Insects*, 1796) writes:—" *Papilio arion* is a very scarce insect in this country, and it does not appear to be much more common in any other part of Europe, as Fabricius only says, 'Habitat in Europæ pratis.' Mr. Lemon, a collector of eminence, some years since met with it in England." In these early days, the apparent rarity of all but the most common insects, was due to ignorance of the distribution of the various species.

Stephens (*Illustrations of Brit. Ent.*, vol. i., pp. 87-88, 1828) writes:—"An insect of great rarity, found on commons and in pastures in the beginning of July; it was taken by the late Dr. Abbott near Bedford, in the Mouse's Pasture, where Mr. Dale caught

a single specimen in 1819; it has also been caught near the signal-house on Dover Cliffs, and on bramble blossoms, in rocky situations, in North Wales; several specimens were taken in Kent during the past season, I believe in the vicinity of Deal; it is said to have occurred near Winchester in plenty; and Lewin tells us that it is found on Marlborough Downs, Wilts, on hills near Bath, and near Clifden in Bucks."

Passing from 1828 to 1857, Stainton adds:—"Barnwell Wold, Northamptonshire," and quotes the following extract from the *Zoologist* for 1852 (p. 3350), by the Rev. Wm. Bree, of Polebrook:—"The great prize of all the butterflies of our neighbourhood, however, I hold to be *Polyommatus arion*, which, if I mistake not, was first discovered here by myself some thirteen or fourteen years since. It is confined entirely, as far as my experience goes, to Barnwell Wold and the adjoining rough fields, with the exception of a single specimen which I once met with in a rough field near Polebrook. . . . Many entomologists have, of late years, visited Barnwell Wold in search of *arion*; in short, a summer never passes without meeting in my rambles with brother entomologists from distant parts of the country. I rejoice, however, to be able to state that its annual occurrence does not appear to be diminished in consequence. Unless my memory fails me, I think Mr. Wolley, of Trinity College, Cambridge, informed me that one year he captured in a few days between fifty and sixty specimens in and about Barnwell Wold, though, in point of weather, the days were anything but favourable." Stainton adds (*Manual*, i., p. 60, 1857):—"Since the above was written the insect has apparently become less abundant," to which, under the circumstances, we would add "as well it might, if the entomologists from different parts of the country served the species as did Mr. Wolley" and Mr. Bond, who took forty-nine specimens at Barnwell Wold, remarking at the time that he reported the capture of these specimens, that the insect "is a very local one, for, although I have searched the Wold well, I have only found it in one spot, in the corner of a rough pasture under a wood; it is an easy insect to take, flying very low, and is very conspicuous, settling occasionally on wild thyme, etc." [*British Butterflies* (Newman), p. 140]. Under the onslaughts of the Wolleys, Bonds, and those who thought that an insect restricted to "a corner of a rough pasture under a wood" could stand their continuous annual attacks without being exterminated, the insect soon became extinct in Barnwell Wold, as it had previously become in Beds, Bucks, Kent, Hunts, Hants and Wiltshire.

About the same time Mr. Quekett and others did their best to exterminate the species in Somersetshire. Of Mr. Quekett's exploits we read:—"I took about forty specimens on the 15th June, 1833, in a situation abounding with long grass and brambles at Langport, near Taunton; and on the same day, in 1834, I took about twenty specimens, and Mr. Dale ten." Newman adds:—"Subsequently Mr. Quekett visited the same locality on several occasions, and always with the same success," and then, of course, *L. arion* became extinct in Somerset.

Devonshire was the next point of attack. In 1865, Mr. Bignell writes that he captured, on June 17th, thirty-six specimens near Plymouth, some of them much wasted (*Ent.*, ii., p. 295), whilst Mr.

Gatcombe writes:—"Two years since, when with some friends, we caught several dozen of that species, and about a fortnight since many were taken in that locality (Bolt Head) by a friend of mine" (*Ent.*, vol. iv., p. 301). Following this up is a further communication from Mr. Bignell (1870), which is quoted by Newman as follows:—"From the Bolt Head to Bolt Tail. One year I took it, wasted, on June 14th; but the following year it did not make its appearance until July 7th." Then comes the following information—Kingsbridge Road (by rail), Kingsbridge (by coach), Salcombe (by steamer or boat), then two miles walk to Bolt Head. This was followed by a series of visits of the fraternity who lived at a distance, two or three being located year after year at the King's Arms, Salcombe, and then, at last, appeared the inevitable note from Mr. Bignell:—"I feel quite certain that the haunts of *Lycaena arion* at Bolt Head must be looked upon as a thing of the past." There is the usual reference to "the destructiveness of the elements," as if the seasons have never had their counterparts in the ten or twenty or hundred thousand years that have elapsed since our *Lycaena arion* were separated from their relatives on the other side of the Channel.

Then came Gloucestershire, when Mr. Marsden (*Ent.*, iii., p. 314), Mr. Merrin (*Ent.*, vol. iv., p. 105), and Mr. Watkins (*Ent.*, vol. iv., p. 120) told the world their localities. Following on this came the usual irruption of the collector tribe—"brother entomologists from distant parts of the country"—to exterminate the local species. Aided as the immigrant collectors were by the locals, who collected the insects in the bad seasons, the process of extermination was rapidly carried on. Again, the weather was to blame, as may be seen by the following note by Mr. Herbert Marsden (*F.M.M.*, 1885), who writes:—"It was on June 17th, 1866, that I first saw the species alive, when, in the course of a long ramble, I captured it in a narrow valley amongst the Cotswold Hills. The early part of June, 1867, was dark and cold, and I only secured some 12 or 15 examples. The season, May and June, 1868, was hot and brilliant, and *L. arion* appeared on June 5th, which is the earliest date I ever heard of the species being out; but, although rather more plentiful than the previous year, it was still rather scarce. In 1869, another fine or partially fine season, it was more abundant, and I find from my diary that on June 19th I took 10 at rest about sunset. The year 1870, however, is the one to be marked with a white stone by the lovers of *Lycanidae*, and *L. arion* appeared much more widely distributed than in any other year I know of, either before or since. It would, I am sure, have been possible for an active collector to have caught a thousand specimens during the season, for, in a few visits, I secured about a hundred and fifty, not netting half of those seen, and turning many loose again. During the next few years *L. arion* continued to appear, but very irregularly as regards numbers; the best seasons since 1870 being those of 1876 and 1877, the latter especially, but on no occasion has it been nearly so abundant as in 1870. Now come the dark days. The latter part of June, 1877, was damp and broken, not at all the bright warm weather which *L. arion* loves. In dark, cloudy weather, they are always still, and I believe they will only deposit their eggs when the sun is warm and bright. In 1878 the weather was worse, there being hardly a fine day in the month,

and less than a dozen were seen, mostly worn and weather-beaten, for there were scarcely two consecutive fine days. In 1879 the weather was still worse, and *L. arion* was scarcer than ever, while in 1880 only two were obtained, and two or three more seen. For the four years, 1881-4, not one has been seen in the Gloucestershire district that I have been able to trace."

But six years before the above was penned, Mr. Marsden had written (*Ent.*, xii., p. 221, 1879) a note, relative to the rapid disappearance of the species in the Cotswolds, and his report was so gloomy that collectors practically ceased to go there for the species. This respite gave the butterfly another chance, for, in 1890 (*E. M. M.*, xxvi., p. 214), we find Mr. Goss "pleased to be able to report that *L. arion* is not, as I feared, extinct on the Cotswold Hills. Yesterday (June 24th), in one of the localities, where I caught *L. arion* in 1877, I took three specimens, all males; of these one was worn, and two had apparently recently emerged from the chrysalis. On visiting a second locality, some four miles from the one last mentioned, I was disappointed at not finding a specimen. To-day I have succeeded in taking two male specimens, both fresh, in a new locality, some two or three miles distant from the former ones." Since then, the gentlemen who wish to "renew" or "enlarge" their series have given the "Blues" on the Cotswold Hills a terrible doing. How local the species is in its haunts in these hills is explained by Mr. Merrin, who says that "the spot most frequented by them was, however, partly sheltered by a stone wall. The same locality subsequently yielded as many as were taken on the first day, while all the district round about, though much of it is of the same character, was perfectly clear of them. This tends to show that the species is very local. On another spot, some miles distant, but of a similar broken character, the species was also found; the area, however, being still more contracted." So regularly have the collectors visited the Cotswolds during the last few years, that the insect has become exceedingly scarce again.

In 1893, Mr. Goss recorded (*E. M. M.*, xxix., p. 190) the capture of the species in North Cornwall, and Mr. McLachlan purposely omitted the locality in the record of these captures. The insect is now confined to the hills and coast of Gloucestershire, Devonshire and Cornwall, and we have no doubt our collectors will pursue it there until its last south-westerly haunt has been reached. Mr. Goss, at a recent meeting of the Entomological Society of London, recounted, with some warmth, the injury done to the species last season by the late Major Still and a London collector.

At the meeting of the City of London Entomological Society, held on June 16th last, it was stated by Captain Thompson that a party of nine was visiting a village in one of the South-western counties for the purpose of aiding in the extermination of this species. Unfortunately, we had previously heard of this, and that some of these visitors were making the journey an annual institution.

The average educated man will naturally ask, what are the marvellous scientific results obtained from the expenditure of so much enthusiasm and ardour, for he will suppose that the scientific result which attracts the same men to the same locality, for the same insect, year after year, must bear some commensurate importance

with the skill and energy expended; and we have to inform the average man that, in 1870, the late Mr. Newman described the egg of the species, whilst, in the same year, Mr. Porritt described the newly-hatched larva, and that the whole of the life-history of the insect, besides these two items, is a blank.

Notes on the deviations in the Life-Histories of *Bombyx quercus* and *B. callunæ*.

By CAPT. B. BLAYDES THOMPSON.

The above species and its variety are set down in *The Entomologist Synonymic List* as *Bombyx quercus*, Linn., v. *callunæ*, Palmer, v. ♂ *roboris*, Schrank; and *callunæ* is at the present time considered as a variety of *B. quercus*. It was not always so, and there are still many careful observers who keep what is known as an open mind on the subject, as in the case of *Tephrosia bistortata* (*crepuscularia*) and *T. crepuscularia* (*biundularia*), and await the result of further investigation. The sponsor of *callunæ* was a Mr. Palmer, but I have failed to make out who he was, and I have also been unable to find the original description of *callunæ* if one was ever published.*

Among the many life-histories to which the signature of Edwd. Newman is attached are those of *Bombyx callunæ* (*Entomologist*, vol. ii., p. 137), and, at the end, he gives a summary of the differences which he (or rather Mr. Backhouse and Mr. Doubleday, through whom he had got the information) had perceived in what he called the two "allied species," whatever that may have meant, for to my mind all the species in the same genus may be taken to be allied. Now these life-histories are so important, in attempting to illustrate the eccentricities of the two insects under our consideration, that I have taken copious extracts from them as a basis for my remarks. With the question of species or variety, I do not propose to meddle, but have tried to collect material scattered through our periodical literature, personal information and notes, in such a manner as to elicit information, and so to furnish a basis for further observation. I will now proceed to read the two separate life-histories, and, as you will see, they are so widely different, that Newman goes out of his way to set out no less than six specific characteristics in which the life-histories diverge, and, in a subsequent volume of the *Entomologist*, he adds one more. Of *B. callunæ*, Newman writes (*Entom.*, 1865, p. 137): "The male flies rapidly over the heather by day at the latter end of May or beginning of June. Its flight is jerking or zigzag, and its object to find the female, which rarely moves until impregnated. The sexes remain *in cop.* about three hours, and about two hours after the union takes place, the female takes wing and flies over the heather with a pendulum-like motion, dropping her ova at random as she flies, which, not having any glutinous covering, do not adhere to any object which they may touch in falling. The act of oviposition lasts from half-an-hour to three-quarters, and, when it is completed, the emptied and exhausted female hides herself among the herbage, and rarely survives the day. The young larvæ emerge on the surface of the earth, or on any object that may have arrested the fall of the egg, and crawl up the stalks and twigs of *Calluna vulgaris* (common

* Refer to Staudinger's *Catalogue* (1871), p. 69.—ED.

ling), their *only natural food-plant*, although in confinement they will eat freely the leaves of *Betula alba* and *B. glutinosa*. On emergence, which usually takes place during the second, or, at latest, the third week in July, the young larva is dark ash-coloured, the incisions of the segments being indicated by two minute orange streaks, etc. At the end of October it hibernates for the winter, and, in April, begins to feed again. In June, it undergoes its final moult, having then completed the first year of its existence, and is full-fed at the end of August, when it retires towards the roots of the ling, and spins a dark brown oblong tough cocoon, which it attaches to the stems and twigs of the heather, ling, sedges, and other herbage, and the cocoons are to be found by separating the herbage down to the roots. Within this cocoon the larva changes to a short, obese dark brown pupa, in which state it continues throughout the winter until the following May or June, when, having completed the second year of its existence, it appears in the perfect state."

Of *Bombyx quercus*, Newman writes:—"The male flies rapidly, both by broad daylight and after sunset, at the latter end of July and beginning of August. The female is very lethargic, and rarely moves prior to impregnation, and afterwards flies heavily and languidly, and never to the same extent or so rapidly as the male. The female oviposits like *callunae*, and the young larvæ emerge towards the end of August. They feed on *Rubus fruticosus* (bramble), *Crataegus oxyacantha* (whitethorn), *Prunus spinosa* (blackthorn), *Cytisus scoparius* (broom), and other shrubs; and towards the end of October they hibernate, and appear again in the spring; they again commence feeding, and are full-fed in May, and then spin a compact oval yellow cocoon, and turn to a dark brown, but not a shining pupa, from which the moth emerges in July."

The differentiation of the two allied species, *B. quercus* and *B. callunae*, is then set forth in the following manner:—"All differences in natural history are attractive in proportion to their amount, and valuable in proportion to their constancy. In pairs of species the amount of difference decreases as the individuals approach maturity. As regards those under consideration the differences are:—1. IN TIME OF APPEARANCE.—*B. callunae* appears in May and *B. quercus* in July. 2. IN THE TIME OCCUPIED IN ARRIVING AT MATURITY.—*B. quercus* takes but one year, and *B. callunae*, two. 3. IN FOOD.—*B. quercus* feeds on whitethorn, blackthorn and broom, and *B. callunae*, only on ling. 4. IN THE ORNAMENTATION OF THE YOUNG LARVÆ.—*B. quercus* has a dorsal series of lozenge-shaped markings, white and orange, and *B. callunae* a dorsal series of triangle shaped spots, orange only. 5. IN PUPATION.—*B. quercus* forms a small yellow cocoon, and *B. callunae* a large brown cocoon. 6. IN THE COLOUR OF THE IMAGO.—The wing-rays of *B. quercus* in passing through the pale band of the wing assume its colour, and in *B. callunae* they are darker than the band. In *B. quercus*, the lower extremity of the band has a direction towards the abdomen; in *B. callunae* the direction is towards the anal angle of the wing, and this holds good, both in the fore and hind-wings, more especially the latter. The males of *B. quercus* are of a ferruginous brown colour, and those of *B. callunae* of umber brown. 7. IN SIZE.—*B. quercus* is the smaller of the two insects." I think there cannot be any doubt in the mind

of any reasonable being that when Edwd. Newman wrote these descriptions, he considered the two insects as distinct species. But when he published his work, *British Moths*, only two years subsequently, he simply introduced *callunæ* in one line, under the heading of *B. quercus*, as a variety, without comment, and I consequently searched *The Entomologist*, of which he was then the editor, to ascertain if he had anywhere explained in its pages the reason for his sudden change of front. My search resulted in the discovery of a short paragraph in that magazine, vol. iii., p. 27, the year after the life-histories were published, which runs as follows:—"In my differentiation of *Bombyx quercus* and *Bombyx callunæ*, I omitted a character which Mr. Doubleday has long observed; the "so-called" *B. callunæ* has a conspicuous white spot in the centre of the fore-wings on the under-side, which is wanting in *B. quercus*, and, as *callunæ* of Palmer is certainly the *quercus* of Linnæus, it is desirable to resort to the Linnæan name, and the *quercus* of Stephens in our cabinets is thus left without a name, and I suggest it should be called *familiaris*, etc." This leaves us in the dark as to how he arrived at the conclusion that the *callunæ* of Palmer was "certainly" the *quercus* of Linnæus, but it is a matter of history that his conclusion has been accepted ever since.*

The title of this paper was suggested to me in consequence of my observing the type and variety constantly mixed up in cabinets, unknown to their owner. I have consulted the "London List," which has been prepared by the Society, and find that there is no record therein of *B. callunæ* having ever occurred in the London district, whilst Mr. Fenn is the only correspondent who reports *B. quercus* in the South-East District, and he says the species is nearly extinct there now. There is also a statement by Mr. Arthur Rose, in the *Ent. Record*, that *B. quercus* occurs on the border of Epping Forest, in the lanes round Sewardstone, just outside the London district. Thanks, however, to several friends, I venture to think that after you have heard what the differences are, and have seen the several exhibits this evening, you will not have much difficulty in future in distinguishing the variety from the type, and I propose to make a few remarks upon Newman's differentiation.

First, as to the "time of appearance." Newman gives May for the variety, and July and August for the type, and with this my own experience coincides. In Yorkshire, the type occurs only on the coast, the specimens found inland being, invariably, *B. callunæ*, and until I got larvæ from Clacton, I had not had any experience in breeding the type. In breeding *B. callunæ* I found that the imagines emerged a little before or after the 1st of June, and there is a fact impressed on my mind in support of that statement which I may mention, viz., that on the day I left home, in 1890, for my trip to the Himalayas, —May 15th, I found a male *B. callunæ* emerged in my breeding cage, which I put in a killing bottle, and set on my return in December the same year. And there is further evidence of the appearance of *B. callunæ* in May, in Mr. Buckler's work on larvæ. On page 57, vol. iii., after describing the larva of *B. quercus*, he states that he had a pair of *B. quercus*, *in cop.*, sent to him on August 25th, 1875.

* Our contributor has missed the point. He should have given us Palmer's original description of *callunæ*, and the Linnæan description of *B. quercus*; then we could have drawn our own conclusions. The former is to be found in the *Zoologist*, 1847, p. 1656, the latter in the *Systema Naturæ*, xth edition, 498.—Ed.

He says that the female laid a number of eggs in the box, and that the larvæ hatched out on September 12th following, *i.e.*, the insect took 18 days to mature in the ovum state. He also describes the larva of the variety *callunae*, on page 58, and states that Mr. Doubleday sent him seven larvæ on the 8th of June, 1868. Now, having regard to the fact that the ova of the type took 18 days to mature, that would indicate that the ova which produced these larvæ were laid at latest on May 21st, and we may safely infer that the larvæ would be a week old, at least, when sent to Buckler; that would bring the date of the laying of the ova to May 14th. I have given these particulars because I find there is considerable scepticism as to the appearance of *callunae* in May at all. There is not a shadow of doubt about *B. quercus* appearing in the imago stage in late July and August, having taken 12 months only for its metamorphoses, and it is only one way of showing the eccentric character of the variety by proving conclusively that it requires two years to mature, and it then appears three months before its type!

Both these larvæ are found in April and May, both have hybernated the preceding winter as larvæ, the larva of *B. quercus* being full-fed at the end of May, spinning its cocoon and pupating in June, and emerging in July; whereas, *B. callunae* is full-fed at the end of August, spins its cocoon in September, hibernates the second winter as a pupa, and emerges in the following May. A correspondent in the *Entomologist* says they sometimes lie over a second winter. Indeed, I have a friend now who has two pupæ, from larvæ that spun up in 1894, with others, that emerged last June. From inquiries I have made, I have not heard of the type hibernating more than once, and if I had heard of such an occurrence as a whole brood of *B. quercus* larvæ hibernating as pupæ, I should have had to satisfy myself that my informant knew the difference between the type and the variety, before I accepted the statement as fact. In the latest published work upon entomology, under the authority of our worthy president, it is stated that "occasionally a batch of eggs laid by a female will produce both forms, a part of the progeny having the *habits* of *quercus* and the other part those of *callunae*." The value of this information depends much upon whether the female was at large when captured, or whether she had been bred and impregnated with a male of the other race, and what the "*habits*" were that are referred to. Because we breed hybrids of *Smerinthus populi* and *S. ocellatus*, I venture to think no one will set up a theory that they are one species.* With regard to the "food," the "ornamentation of the young larva," and "pupation," there is nothing, taking these differences *seriatim*, which is extraordinary. In a state of nature, I believe, *callunae* is invariably found upon heather, or, as Newman calls it, ling, and that the type is polyphagous, if not omniphagous, and that they are never found in the same locality. In the case of the wing rays and the shape of the curvature of the bands, these distinctions are of great use in enabling the student to distinguish the races at once, but are otherwise immaterial.

(To be continued).

* Species is largely a matter of definition. See Mr. J. Alston Moffatt's paper on "Variation," in *The Report of the Entom. Society of Ontario*, 1895, where he goes much further than this. The *Report* is in the library of the City of London Entom. Soc.—Ed.

MIMICRY.

IV.—HISTORICAL REVIEW OF REMARKS MADE BY VARIOUS OBSERVERS AS TO THE ORIGIN OF LEAF-MARKINGS DISPLAYED BY CERTAIN BUTTERFLIES FOR PROTECTIVE PURPOSES ON THE UNDER SURFACES OF THEIR WINGS.

By J. W. TUTT, F.E.S.

It has been suggested that it would be interesting to relate briefly some of the published remarks relating to those butterflies which, for protective purposes, exhibit on the undersides of their wings the appearance and markings of leaves.

Most butterflies when at rest close their wings vertically over the back, and then allow the fore-wings to slide back as far as possible into concealment behind the hind-wings. The area of the wings thus exposed to view consists of the whole of the hind-wings and the apices of the fore-wings. This area is usually so coloured and marbled as to render the butterfly inconspicuous in its resting-place.

Among the many patterns with which the exposed portions of the wings are provided, there can be no doubt that the "leaf-markings" of the oriental genus *Kallima* are among the most specialised. These butterflies are conspicuous objects when flying, but when they alight upon a twig, the wings raised over the back, and the fore-wings thrown well forward, the pattern and colour of the under-surface are such that they make a perfect resemblance to a leaf. The mid-rib consists of a coloured stripe crossing both wings, which, taking its rise at the apex of the fore-wing, is continued over the hind-wing, and terminates in a tail-like extension of the latter, the extension just reaching the twig, and thus resembling the pedicel of a leaf. The Nymphalid butterflies of this genus—*Kallima*—are large, the Indian species—*paralekta*, *inachis*, and *philarchus*, being nearly four inches in expanse, whilst the African species, *K. rumia*, is smaller, nor is the underside resemblance to a leaf so perfect. Butterflies of other genera, however, have very similar protective leaf-markings.

Kirby and Spence (1815) were the first authors to apply the term "mimicry" to the resemblance that insects bore to the objects on which they rested. In the introduction to their treatise on entomology, they write:—"You would declare, upon beholding some insects, that they had robbed the trees of their leaves to form for themselves artificial wings, so exactly do they resemble them in their form, substance, and vascular structure; some representing green leaves, and others those that are dry and withered. Nay, sometimes this mimicry is so exquisite, that you would mistake the whole insect for a portion of the branching spray of a tree."

At the meeting of the British Association, 1859, Mr. Andrew Murray read a paper upon the "Disguises of Nature," in which he showed that the most perfect imitation of inanimate objects occurs, not rarely or exceptionally, but in some groups so commonly, that the want of it might be regarded as the exception, and that the concealment of the animal was the plain purpose of the disguise. So hopelessly lost was he for an explanation, however, that he could only suggest that the cause of this phenomenon might be found in some force analogous to the great law of attraction, that "like draws to like, or like begets like."

The theory of natural selection, however, propounded directly

afterwards by Darwin, gave a clue to the cause of this resemblance, and, although, as we have already said, we prefer Weismann's view (the presence of "variational units" in every germ), to that of Darwin, to account for the presence of the elements of variation in the organism itself, yet, there can be no doubt that the theory of selection, by which useful variations are seized upon and adapted to specific ends, in directions useful to the individual, explains how these marvellous resemblances have been brought about, and how insects have become assimilated in superficial appearance to the vegetable or inorganic substances on which or among which they may rest.

The application of the Darwinian principle to this particular phase of protective resemblance was worked out at length by Wallace. He writes:—"The other species to which I have to direct attention is the *Kallima paralekta*, a butterfly of the same family group as our Purple Emperor, and of about the same size or larger. Its upper surface is of a rich purple, variously tinged with ash colour, and across the fore-wings there is a broad bar of deep orange, so that, when on the wing, it is very conspicuous. This species was not uncommon in dry woods and thickets, and I often endeavoured to capture it without success, for, after flying a short distance, it would enter a bush among dry or dead leaves, and, however carefully I crept up to the spot, I could never discover it, till it would suddenly start out again and then disappear in a similar place. At length, I was fortunate enough to see the exact spot where the butterfly settled, and, though I lost sight of it for some time, I, at length, discovered that it was close before my eyes, but that, in its position of repose, it so closely resembled a dead leaf attached to a twig, as almost certainly to deceive the eye, even when gazing full upon it. I captured several specimens on the wing, and was able fully to understand the way in which this wonderful resemblance is produced. The end of the upper wings terminates in a fine point, just as the leaves of many tropical shrubs and trees are pointed, whilst the lower wings are somewhat more obtuse, and are lengthened out into a short thick tail. Between these two points there runs a dark curved line, exactly representing the midrib of a leaf, and from this radiate on each side a few oblique marks, which well imitate the lateral veins. These marks are more clearly seen in the outer portion of the base of the wings and, on the inner side, towards the middle and apex, and they are produced by striæ and markings which are very common in allied species, but which are here modified and strengthened so as to imitate more exactly the venation of a leaf. The tint of the under surface varies much, but it is always some ashy brown or reddish colour, which matches with those of dead leaves. The habit of the species is always to rest on a twig and among dead or dry leaves, and, in this position, with the wings closely pressed together, their outline is exactly that of a moderately-sized leaf, slightly curved or shrivelled. The tail of the hind-wings forms a perfect stalk, and touches the stick, while the insect is supported by the middle pair of legs, which are not noticed among the twigs and fibres that surround it. The head and antennæ are drawn back between the wings, so as to be quite concealed, and there is a little notch hollowed out at the very base of the wings, which allows the head to be retracted sufficiently. All these varied details combine

to produce a disguise that is so complete and marvellous as to astonish everyone who observes it; and the habits of the insects are such as to utilise all these peculiarities, and render them available in such a manner as to remove all doubt of the purpose of this singular case of mimicry, which is undoubtedly a protection to the insect. Its strong and swift flight is sufficient to save it from its enemies when on the wing, but if it were equally conspicuous when at rest, it could not long escape extinction, owing to the attacks of the insectivorous birds and reptiles that abound in the tropical forests. A very closely allied species, *Kallima inachis*, inhabits India, where it is very common, and specimens are sent in every collection from the Himalayas. On examining a number of these, it will be seen that no two are alike, but all the variations correspond to those of dead leaves. Every tint of yellow, ash, brown and red is found here, and, in many specimens, there occur patches and spots formed of small black dots, so closely resembling the way in which minute fungi grow on leaves, that it is almost impossible at first not to believe that fungi have grown on the butterflies themselves" (*Malay Archipelago*, p. 203).

Varieties of *Melanippe fluctuata*.

By LOUIS B. PROUT, F.E.S.

(Continued from p. 103).

After a good deal of planning and arranging of my material, I have come to the conclusion that I can best make this paper serviceable to entomologists of differing opinion, with regard to the question of varietal nomenclature, by adopting a system of broad division and minuter sub-division. I shall, therefore, first give what appear to be the correct names for Guenée's aberrations, for use by those who aim only at a rough approximation; and shall then sub-divide these into all the forms which are in any way worth distinguishing, after the more thorough manner employed by Mr. Tutt in his *British Noctuar and their Varieties*.

The type has already been defined, and will include, in Guenée's sense, all specimens in which the central fascia is neither reduced nor extended, nor the ground-colour conspicuously darkened.

Ab. incanata, Reuter (*Acta Soc. F.F.F.*, ix., No. 6, p. 72).—This is the oldest available name that I can find for Guenée's *var. A*—dark central fascia extended right across the wing. I believe these forms do not at all tend to become local races, except in the case of the *var. acutangulata*.

Var. neapolisata, Mill. (*Icon.*, iii., p. 267, pl. 130, fig. 7).—This is one of our best known, and most generally used, varietal names, and though I have called it "*var.*," yet it also appears as an occasional aberration in many localities. It certainly represents roughly Guenée's *var. B*, though he may probably have known no very extreme forms; it may be used comprehensively for all forms with darkened ground-colour. It forms a local race in Naples and Sicily, and, in a measure, in Yorkshire and Scotland. With regard to this variety, I may also remark that in Naples, at any rate, it must be at least a fixed local race, even if it do not ultimately prove to be a distinct species; for Millière states that the male antennæ are more strongly pectinated than in the

type. Judging from his figure in the *Iconographie*, and from his own remarks, the Neapolitan form does not very closely agree in tone with the Aberdeen; the former is much colder brown (almost *grey*) than the latter, and with some white markings remaining, and the hind-wings also are not conspicuously darkened. It is, as Mr. South says (*Entom.*, xxv., 137), a great pity that Millièrè did not also figure his female *neapolisata*, from the same locality as the original male; the female (*Ann. Soc. Ent. Fr.* (6), vii., pl. v., fig. 7) was from Aberdeen, and the figure is precisely identical in tone with the Pitcaple specimen which I am exhibiting this evening. It is not unlikely that we may ultimately have to abandon this familiar name for our Northern dark form.

Ab. costorata, Haw. (*Lep. Brit.*, ii., 334).—This name is generally applied only to forms with a very small central costal blotch, but, comprehensively, it may be used for all forms in which the central fascia is reduced in width; for Haworth himself mentions that it is very variable, and includes those forms in which the remnant of the central fascia is *not* costal, and even those in which it extends right across the wing, though very narrow. I have in my own collection one good example of this *costorata-incanata* form. It is the comprehensiveness of Haworth's diagnosis which has led Guenée to conclude that it does not deserve to be separated because it "differs only in the form of the central blotch;" while immediately below he has himself differentiated the most common *costorata* forms (H.-S., 292-294) as his var. c. This aberration, perhaps, shows some tendency to form a local race in the Swiss Alps (see Frey's *Lep. der Schweiz*, p. 229), but is generally of purely accidental occurrence, as, for example, round London, and probably in most parts of Britain; there are several interesting specimens of it in the Zeller collection, merely labelled "Europe."

There are a few varietal names, in the genuine sense, which are also unquestionably worth retaining.

Var. *acutangulata* (Christ.) Rom., *Mém. sur Lep.*, iii., p. 2, pl. 1, fig. 1.—This, as I have already said, is the Caucasian form of the species. Strictly speaking, *putridaria*, H.-S., 535 (*rev.* 536), from Elizabethpol, would have priority over this name; but there seem to be two reasons for retaining the later name:—1. Herrich-Schaeffer's *putridaria* is based on some confusion, as the good species figured as 536 (♀) is no doubt the species which he intended to erect under this name, and which is still known by it; but by error he figured a *fluctuata* var. as its ♂. 2. *Acutangulata*, Rom., is more comprehensive, designed for the entire local race, and including forms slightly different from H.-S. 535. Romanoff's ♂ figure (fig. 1a) has a narrow central fascia, not white in the middle of its costal portion; his ♀ figure (fig. 1b) agrees fairly well with H.-S. 535, though not quite so strongly marked, both having the middle of the broader costal end of central fascia white. The most rational course seems, therefore, to be to designate the variety comprehensively "var. *acutangulata*, Rom.;" but we may denote as "*ab. putridaria*, H.-S.," the interesting aberrations with the said pale patch in the centre of the median band. I have two or three European records for *ab. putridaria*: Arctic Norway and Malaga (Staudinger, *S.E.Z.*, xxii., 394), in the former of which localities I suspect that the var.

acutangulata is the dominant form (*vide* Schöyen, *Archiv for Mathematik*, etc., v., 194); Howth, Ireland (*Entom.*, xxv., 137); and probably elsewhere in the British Islands, as I recently saw, at the Entomological Society of London, a figure from the collection of Mr. S. J. Capper.

Var. *syriacata*, n. var.—The forms announced in Staudinger's trade lists as "var. e *Syria*," and coming from Palestine, etc., do not seem to fit with the last-named variety, as the central fascia is frequently abbreviated, the outer area of the wings less marked, the basal patch not white, etc. As I have only seen four specimens from the region, it is very rash to attempt to diagnose it; but if it proves to be a marked local race at all, it will be distinguished through the weakly-marked ground-colour and whitish hind-wings, perhaps also by the lack of some of the abdominal spots.

Var. *idtuata*, Gn., x., 403.—This is the North American representative of *M. fluctuata*, and is said to be smaller (on the average), the wings blunter, more chalky-white, the central fascia more dentated at its edges, etc. It seems to be variable also in America, and the Labrador forms probably come rather near some of the Norwegian.

The ab. *americana* of Gumpfenberg (*Systema Geometrarum*, Theil iii., p. 286) [1890]; Packard (*Monograph*, pl. viii., fig. 72), has the basal and median patches distinctly reddish-brown. It is not unlikely that this may also occur casually in the Old World.

On a supposed new species of *Leucania*.

By J. W. TUTT, F.E.S.

In the *Entomologist's Monthly Magazine*, vol. xxxii., p. 100, Mr. C. G. Barrett describes a *Leucaniid*, captured upon the Essex coast, in July 1895, by Mr. Mathew. The specimens described consist of a male and three females, and Mr. Barrett considers that they belong to a hitherto undescribed species.

His description is very minute. Roughly, the insect may be said to differ from *L. pallens* in the presence of a transverse series of black dots on the fore-wings in the position of the elbowed line. Mr. Barrett writes of the fore-wings as being "rather broader than in *L. pallens*, and more pointed at the apex, shaped, in fact, as in *L. straminea*; costal and dorsal margins nearly straight; apex acute; hind margin below it oblique and faintly hollowed, but rounded off at anal angle; entire surface of a smooth soft honey-colour, or colour of the honey-comb (a shade of buff difficult to describe); having the nervures faintly perceptible, but not paler in colour. At the apex of the discal cell is a round black dot as in *L. pallens*, and two more lie in the position of the ordinary 'second line' or 'elbowed line,' which is further indicated by faint blackish dashes, more particularly towards the costa, where this faint line is decidedly curved back. Hind-wings rounded, white at the base and apex, but with the middle area tinged with smoky-grey and reddish; all the nervures broadly dusted with blackish; cilia white. Under-side of the fore-wings pale buff, tinged in the middle with brownish; before the apex is a black spot on the costa, indicating a faint slender transverse line; hind-wings yellowish-white dusted with black, and having a slender transverse

series of black dashes on the nervures. In the female the fore-wings are broader and more decidedly acuminate, also as strongly honey-coloured; in one specimen, the blackish indications of a 'second line' on the fore-wings are absent; in another they are more noticeable than in the male; but in the third there is a conspicuous and complete curved line of black dashes and spots from the costal to the dorsal margin, where it is supplemented by further blackish dashes along that margin, and a black spot in the position from which would arise the usual *first* line. This last specimen is a very striking and conspicuous insect. I know of no connecting link to unite the form which I have here described with *L. pallens*, yet, from the presence and position of the three round black dots (when visible) a very close alliance to that species must be admitted; still, from the somewhat greater robustness of the thorax, the greater breadth and different shape of the fore-wings, and their very peculiar colour and texture, I am disposed to think it specifically distinct, and, in that view, propose for it the name of *favicolor*. At first sight, it strongly reminds one of *Nonagria lutosa*, and especially of the small race of that species which was once called *N. rectis*, but from this species its hairy eyes at once separate it."

The description led us to suppose that it might be the aberration of *Leucania impura* ab. *punctilinea* (*Brit. Noct.*, i., p. 40), and we made this statement (*ante*, p. 38), but an examination of the specimens exhibited by Mr. G. F. Mathew, at the meeting of the Ent. Soc. of London, on June 3rd, showed that the specimens were, as Mr. Barrett had suggested, more closely allied to *L. pallens*.

After a very careful examination, we came to the conclusion that they were, in reality, aberrations of the latter species, forming, indeed, a parallel aberration to that of ab. *punctilinea* in *L. impura*, but, in the female specimen, much more strongly marked.

It is well known that typical specimens of *Leucania straminea* and *L. obsoleta* have a well marked transverse row of small black dots forming the elbowed line, and that a transverse row of tiny dots exists on the nervures of the hind-wings in these species. It is the form of *L. impura*, which exhibits similar markings to these, that has been named *punctilinea*, and it appears to us that it is a parallel form of *L. pallens* which Mr. Barrett has named *favicolor*. The form of *L. pallens*, known as ab. *arcuata*, St., has the transverse row of dots on the nervures of the hind-wings, but these specimens not only possess these spots remarkably well-defined, but the dots forming the elbowed line of the fore-wings are much better defined than in any we remember to have seen before.

It may be in the recollection of some that in *British Noctuae and their Varieties*, vol. iv., p. 11, we discuss a remarkable statement of Mr. Butler, who, in the British Museum collection, lumps a long series of American *L. pallens* with a few British specimens of *L. straminea*, and makes the following astounding statement:—" *L. pallens* of the United States agrees absolutely with the European *L. straminea*. The two forms have practically the same characters, and, if received from any extra-European locality, would never have been considered distinct; indeed, it is possible to find examples which cannot with certainty be referred to one form rather than the other. *L. straminea* differs chiefly in the generally more prominent pale longitudinal

streak above the median vein of the primaries and the better-defined black or dark markings" (*Trans. Ent. Soc. Lond.*, 1890, pp. 660-661). There is no need to recapitulate our criticism of this statement after a close inspection of the series in the British Museum collection, except to say that there we found seven specimens of European *L. straminea* mixed up with a row of American *L. pallens*.

Speaking from memory, we have an idea that the American *L. pallens* had more or less strongly developed traces of the dotted elbowed line, and, in this respect, resembled the newly-described form *faricolor*.

SCIENTIFIC NOTES AND OBSERVATIONS.

INSECT VISION.—The latest that has been discovered relating to this subject will always be of interest. Hence the following:—"It has always been assumed that flowers attracted insects, in large measure, at least, by the splendour of their inflorescence. Some recent experiments by Plateau, recorded in the *Bulletin of the Belgian Academy*, throw doubt upon this assumption. In a considerable bed of showy dahlias, Plateau concealed from sight the highly-coloured rays of some of the flowers, exposing only the disc, and in a second series of experiments the disc also, but independently, either by means of coloured papers or by green leaves secured in place by pins. Butterflies and bees sought these flowers with the same avidity, and apparently the same frequency as the fully exposed flowers in the same patch, the bees particularly pushing their way beneath the obstacles to reach them, though not always with success. Plateau concludes that they are guided far more by their perception of odours than by vision of bright and contrasted colours. In a second communication to the same Academy, Plateau gives the details of another set of experiments to determine whether a wide-meshed net presents any obstacle to the passage of a flying insect, which, as far as room was concerned, could easily pass in flight through the interstices. He finds that while such nets do not absolutely prevent passage on the wing, insects almost invariably act before one they wish to pass as if they could not distinguish the aperture, ending by alighting on the mesh and crawling through. He reasons that, through the lack of distinct and sharp vision, the threads of the net produce the illusion of a continuous surface, as for us the hatchures of an engraving seen at a distance" (*Psyche*).—J. W. TUTT.

EGG PARASITES.—I have recently been engaged in reading up the back volumes of *The Entomologist's Record*, and was particularly interested in your treatise on the "Ovum or Egg" (May and June, 1894), and I am thus induced to send you the following account, which may possibly be of interest in connection with this subject. During October, 1894, I took a batch of ova of *Orygia antiqua*. The remains of a ♀ with the eggs, I discovered on the empty cocoon, on the underside of a bramble leaf. There was nothing unusual in this, but I was greatly surprised in the following spring to observe that the greater number of eggs hatched out a small species of ichneumon, the remainder having previously produced the ordinary larvæ. I had kept an eye on the ova, as I noted they had not all hatched. This may be known to science, but in your article I do not see that ichneumons are

mentioned as distinctive to ova, and this is not the only case that has come under my observation. An ovum of *Cerura vinula*, taken last year, also produced an ichneumon fly. I presume these flies were of different species. The larvæ of the former passed the whole winter within the egg, whereas the latter came out in some six weeks or two months, and, indeed, I think the one from *C. vinula* was larger. The others I still have in a box. If you care to see them, I can forward them, though they are very small and shrivelled.—C. BINGHAM NEWLAND, Kalletra, Mallow, Co. Cork. *May 27th*, 1896.

PUPA OF MELITEA AURINIA.—I have often wondered how Hellins figured such a dark pupa of *M. aurinia* (*Larvæ of Brit. Butts.*, pl. xii., fig. 2a), but I observe that for some hours previous to emergence the pupa turns to a purplish hue. No doubt Hellins' drawing was made from a pupa in this stage.—J. W. TUTT, Westcombe Hill, S.E.

A NEW MODE OF SEPARATING THE FEMALES OF POLYOMMATUS BELLARGUS AND P. CORYDON.—In addition to the differences enumerated as existing between these species (*ante*, p. 50), I should like to point out the following difference, which I think has not yet been noted. If the undersides of these species be examined carefully, side by side, it will be observed that the dark crescent-shaped markings on the undersides of the anterior wings of *Polyommatus corydon* and *P. bellargus* constitute a sure and easy method of differentiating the females of these two species. In *P. bellargus* the markings lie very evenly in the venule spaces, whether their convex sides are acute or otherwise, and the axes of these crescents all converge towards the base of the wings. Now, in *P. corydon* there are two distinct sets of markings. Three within the spaces of the sub-costal and discal venules being quite different from the three in the spaces of the median venules. In the former case the crescents are more or less acute, and their axes tend downwards and inwards. In the latter case, and here comes the most pronounced character, the markings are frequently oblong, extending obliquely inwards and upwards. Where they retain a more or less crescent form, their axes, that is, lines passing through their most convex part, still pass inwards and upwards. I have examined many specimens, but I have seen none that I have not been able to at once identify on these lines.—H. TUNALEY, F.E.S., 30, Fairmount Road, Brixton Hill, S.W.

OVIPOSITION OF TROCHILUM BEMBECEFORME.—As I have noted in previous years, I continue each year to find the eggs of this species laid on the undersides of the leaves of osiers, where the species is common, so that there can be little doubt that this is not a mere occasional vagary, but the normal method of oviposition in this species. The young larva must have several feet to travel to reach the usual habitat of the larva; but by travelling downwards it must inevitably meet with wood of a proper age. Possibly the young larva enters younger wood than we usually credit it with. I enclose you some leaves with ova.—T. A. CHAPMAN, M.D., F.E.S., Hereford. *June 15th*, 1896.

IS MINOA MURINATA (EUPHORBIA) DOUBLE-BROODED?—(See ENT. REC., *June*, 1896, p. 84).—As a fact, in connection with the above question, I may state that on the 4th of August, 1893, I took a specimen of this moth, evidently only just out of the pupal state; it is not rare here in most seasons during May. In the year 1893 it was out in April, earlier than I had ever before noticed it.—O. P. CAMBRIDGE, M.A., F.E.S., Bloxworth Rectory. *June 16th*, 1896.

CURRENT NOTES.

The sale of Mr. J. Trimmer Williams' collection, on June 16th, was not at all satisfactory. The insects were in good condition, but unlabelled, and in the middle of June entomologists evidently prefer fields to the sale-room.

Larvæ of a *Coleophora* were found on *Vaccinium vitis-idaea*, at Rannoch, by Mr. W. Salvage, in the springs of 1884, 1891, 1893, and again this year, 1896. From these Mr. W. H. B. Fletcher bred imagines which were identified as *C. glitizella*, Hfnn., by comparison with specimens in the "Stainton" collection. Mr. Bankes has now compared larval cases and imagines with Dr. Hofmann's original description (*Stett. Ent. Zeit.*, 1869, pp. 119-122), as well as with the insects and cases in the "Frey," "Zeller" and "Stainton" collections, and gives a description (*E.M.M.*) of the imago, larva, case and pupa of the Scotch insects. It appears that Scotch specimens "differ somewhat from Continental ones," and Mr. Bankes gives us as points of difference that (1) "Scotch specimens seem, as a rule, to run decidedly darker than those from the Continent;" (2) "The larvæ of Scotch specimens are redder than those of German ones, the full-fed larvæ of the latter being of a beautiful bright yellow. The fore-wings of the imago are glossy, unicolorous, varying in colour in different individuals, from rather dark grey to pale greyish ochreous. *Exp. al.*, 12-14 mm. Hind-wings glossy, dark grey to very pale grey; cilia, pale grey to greyish-ochreous." The females average smaller, and are less grey and more strongly ochreous than the males. The case is nearly straight, irregularly cylindrical-oval, 7-8 mm. long, formed of cut pieces of leaf, smooth and somewhat polished, and varying in colour from very dark to bright pale brown. It has a distinct keel along each side, and its general shape is likened to a young pea-pod. The young larva is said to mine a leaf of its food-plant in June, and hibernates in its mine, quits the latter in early spring, makes a case, feeds a little while, æstivates, and then hibernates until the next spring, when it feeds up rapidly, mining a broad gallery in the leaf, following the margin, and, on leaving the leaf, makes a new case, in which it travels to a fresh leaf. It spins up for pupation at the end of April, and the moth emerges about the middle of May, on the Continent, but a month later, middle of June, in Scotland. Dr. Chapman states that the way in which the first pair of legs covers a portion of the maxillæ, and also of the second pair, is peculiar. Mr. Bankes, in his description, counts the head of the larva as the "first" segment!

Mr. R. McLachlan (*E.M.M.*) has suggested that the peculiar spine or tooth found on the 4th segment of the male of *Panorpa*, and usually concealed under a bristly flap or projection of the middle of the apical margin of the 3rd segment, is stridulatory. Dr. Felt (*Tenth Report of the New York State Entom.*, 1896) inclines to the opinion that the structure is glandular, and secretes a volatile oil, attractive to the female.

Mr. J. J. F. X. King captured a pair of *Agrypnia picta*, Kol., last year, in Unst. This species had hitherto been known as British, from a specimen taken on a gas-lamp, near London, by Mr. Pryer.

Mr. H. Slater, of Wansford, Northants, records the capture, on June 1st, of a specimen of *Ino statice*, which has "a normal male-

feathered antenna on the right side, and a slender female one on the other." He also found that the "right wings were a shade longer and larger than the left, which seems corroborative evidence of hermaphroditism."

In the *Field* of June 6th last, Mr. E. G. B. Meade Waldo states that he saw a fine specimen of *Danais chrysippus* in a field of trifolium, near his house at Lymington. Was the species *Anosia archippus*? If so, its early appearance, coinciding, as it does, with the early movement of this species in North America, is interesting.

Mr. F. C. Adams records the capture, on May 29th last, of a fine specimen of *Chrysocephala nigra*, in the Rhinefield Enclosure, New Forest. This is supposed to be the second recorded British specimen.

It is with great regret that we record the death of the veteran entomologist, Mr. Peter Inebald, F.L.S., F.E.S., at Hornsea, on June 13th last. The celebrated Royal Academician, Edward Armitage, R.A., F.E.S., who died on May 24th, was also a Coleopterist and a Fellow of the Entomological Society of London.

In *British Tortrices* (1859), Wilkinson writes:—"The folding and twisting of the leaves and twigs is accomplished by means of an elastic silk, spun by the larva, usually of a whitish colour, which hardens and contracts on exposure to the air, and this draws opposite portions of the leaves towards each other. A series of spinings and contortions effect the end in view. The operation is, therefore, twofold: first, the act of the larva itself; secondly, the force exercised by the contraction of the silk; there is otherwise no accounting for the extraordinary folding and bending of stubborn leaves, obviously beyond the unassisted strength of minute larvæ." In the *Ent. Mo. Mag.*, vol. ii., p. 15, Mr. Piffard wrote:—"There appears to me to be another reason for the approximation of the portions of leaves spun together, *viz.*, the contractile power of the recently spun web itself, which certainly shrinks very considerably in a short space of time; and this must be of great assistance to the leaf-rolling larva." Dr. Knaggs (*E.M.M.*) thinks that it is high time that someone made a more thorough investigation of the matter. Why not Dr. Knaggs?

NOTES ON COLLECTING, Etc.

EARLY APPEARANCE OF *ORGYIA ANTIQUA*.—In connection with Mr. Tutt's remark (*ante*, p. 119), I may add that I saw two specimens of *O. antiqua* on the wing as early as April 4th, in Chattenden Woods.—H. TUNALEY, F.E.S., 30, Fairmount Road, Brixton Hill, S.W.

WHITSUNTIDE IN THE NEW FOREST.—On May 22nd, 1896, the members of the North London Natural History Society started on their annual Whitsuntide excursion to the New Forest. Messrs. C. B. Smith, L. J. Tremayne, C. Nicholson, R. W. Robbins and W. H. Smith, left Waterloo by the usual 5.50 train, and arrived at Lyndhurst Road soon after 9.0 p.m. Thence they proceeded by 'bus to Lyndhurst, and were comfortably settled in their rooms at Lynwood a little before 10 p.m. The following morning was dry, but dull. All the members were out before breakfast. The fences only yielded a specimen of *Eupithecia vulgata*, a specimen of *Coremia ferrugata*, and a worn specimen of *Taeniocompa stabilis*; but a walk round Pond Head

enclosure revealed the fact, that larvæ, at any rate, were about in their usual numbers. Mr. Bacot turned up at breakfast time, and soon afterwards the whole party started out, taking the usual route down Beechen Lane. Larva-beating was immediately commenced, but only with moderate success. The quantity, indeed, was great, but the quality left much to be desired. All the Hybernias were common, *H. defoliaria* and *H. marginaria* being particularly and abnormally plentiful. But the larvæ of the local species were, for the most part, scarce, and the following were beaten at various times throughout the trip: *Psilura monacha* (one or two), *Eupithecia abbreviata* (one), *Himera pennaria* (common), *Asphalia videns* (a few), *Brephos parthenias* (a few off birch), *Asphalia flavicornis* (do.), *A. diluta* (a few off willow), *Cleoceris riminalis* (do.), *Hypsipetes sordidata* (do.), *Zephyrus quercus* (two), *Catocala promissa* and *C. sponsa* (a few), *Taeniocampa miniosa* (in plenty off the oak), *Amphipyra pyramidea* (a few), *Hylophila bicolorana* (one), *Cabera pusaria* (one), *Agriopsis aprilina* (one). A notable absentee was *Amphidasys strataria*, whilst *Miselia oryzaanthæ* and *Diloba coerulescephala* were also not in evidence. The day showed signs of becoming brighter, and a few butterflies appeared on the wing, including *Brenthis euphrosyne* and *Pararge egeria*, the latter in very fine condition, evidently the second brood just emerging. On turning into the pine woods, plenty of moths were found flying, mostly *Thera variata*, *Panagra petraræ* and *Venilia macularia*, though Mr. L. J. Tremayne took a specimen of *Drepana lacertinaria*, and Mr. C. Nicholson one of *D. falcata*, and one of *Cidaria suffumata*. The party worked on to the railway line in the hope of taking *Macroglossa fuciformis* (the Narrow-bordered), but the Alkanet (*Anchusa officinalis*) was mostly over, and the sun was not bright enough to induce these insects to fly. The party thereupon made a halt for lunch, and, after lunch, finding collecting decidedly slack, the party rested for an hour or so on the railway bank, except Mr. C. B. Smith, who worked further down the line. Eventually the members, still without their president, turned towards home. The railway bank had yielded *Syrichthus malvæ*, *Nisoniades tages*, *Euclidia mi*, *E. glyphica*, and one or two specimens of *Polyommatus icarus* were also flying about. One specimen of *Callophrys rubi* had also been taken by Mr. W. H. Smith during the day. The party worked back through Denny Bog and Wood, and on their arrival at Lynwood found Mr. Harvey awaiting them. The President did not appear till some time afterwards; he had, it appeared, been right up to the "lucina" ground, but failed to find that insect, the weather being much too dull, but had been rewarded by a couple of specimens of *Macroglossa fuciformis*, and one of *M. bombyliiformis* (the broad-bordered species). After tea, the party set out to sugar in Hurst Wood. Plenty of GEOMETRIDES flew at dusk, but these proved to be only *Larentia viridaria*, *Panagra petraræ*, and other common kinds. Before the sugar was well laid on, rain began to fall, which it soon became evident had set in for the night. We soon had to return home, but not before it became obvious that not a single moth was coming to the sugar, and "assembling" with a specimen of *Eurymene dolobraria*, obtained by Mr. Bacot in the afternoon, was equally unprofitable. On May 24th, before breakfast, Messrs. L. J. Tremayne and Bacot worked in "Jones'" enclosure for the larvæ of *Limenitis sibylla*, but without result, and a search for the larvæ of

Argynnis paphia, in Beechen Lane, was equally unsuccessful. After breakfast, the whole party started for Rhinefield, with the exception of Mr. Nicholson, who preferred to go for *Nemeobius lucina*. The day was fine and bright, and the members spent some little time on Butt's Lawn, searching for *Callophrys rubi*, but they were unsuccessful, though some fine specimens of *Phytometra viridaria*, *Ematurga atomaria* and *Brenthis euphrosyne*, were taken. They then turned into Hurst Wood, where hard beating produced about 20 larvæ of *Catocala promissa*. On emerging on to the heath, between Hurst Wood and Vinney Ridge, the members were unable to resist the temptation of a dip in the Lymington river, after which they proceeded direct to Rhinefield. Contrary to expectation, the rhododendrons were scarcely out at all, though the azaleas were in full bloom, and the latter afforded most of the attraction for the few insects that were on the wing. Although Mr. Harvey took a specimen of *M. bombyliiformis*, almost immediately on entering the avenue, scarcely any more were seen; and though the members remained on the ground for an hour or two, no success rewarded their patience. In the afternoon the party returned home via Vinney Ridge and Butt's Lawn. In the evening, Messrs. L. J. Tremayne, R. W. Robbins, Harvey and Bacot, started to dusk at Matley. Going across the heath by the side of the Matley road, they turned up a few specimens of *Scodiona belgiaria*, at rest. Mr. L. J. Tremayne also took a specimen of *Drepana lacertinaria*, flying. Dusk at the Bog, however, again proved a failure, as, with the exception of some rather worn specimens of *Pachycnemis hippocastanaria*, nothing worth taking was netted. Subsequently the party returned across Whitemoor, and took a few more *Scodiona belgiaria*. The next day was spent by the members at Stubby Copse, working for *Nemeobius lucina*, of which Mr. Nicholson had taken seven the previous day. Very moderate success, however, attended the North Londoners to-day, as, although there was plenty of sunshine, the Duke of Burgundy Fritillary was only taken singly, and the numbers only reached about seven in all. Several other collectors were observed in the rather restricted localities to which the insect is confined, and it is feared that these may be getting somewhat worked out. There were plenty of insects on the wing, but nothing of any special note was taken. The members had to return to town the same evening. One or two larvæ of *Bombyx trifolii* were taken during the trip, but it is not thought advisable to give the exact locality.—LAWRENCE J. TREMAYNE.

WITHERSLACK IN JUNE.—Witherslack once more! On the 12th of June, I paid a visit to my old hunting-grounds, and although in an unfit state of health for collecting seriously, I made the best use of the four days I had there. The weather was all that could be desired, from a moth-catcher's point of view, calm, but frightfully hot. However, I can stand hot weather, and made a fairly good catch. The most astonishing feature was to find normally July insects out in early June, and many even had been evidently out since the end of May; among others, *Coenonympha typhon* and *Argynnis adippe*. Among the smaller fry—*Ocpeilus parvidactylus*, *Acipitilia tetradactyla*, *Coleophora juncicolella*, *Butalis fuscoenella* were common, whilst of *Euthemonia russula* I captured both sexes, one with almost black hind-wings. *Lithosia mesomella*, *Acidalia fumata*, *Aspilates strigillaria*, *Hygia aurovaria*, *Polyommatus* var. *salmacis*, *Macaria liturata* and

Crambus pascuellus in plenty, whilst several other species turned up singly. A nice variety of *Polyommatus icarus* ♂, with pale yellow spots on the borders of both fore and hind-wings, was given to me by my good friend Lochan, who saw another, but failed to get it. He sugared one night, and obtained *Aplecta tincta*.—J. B. HODGKINSON, F.E.S., Roseberry House, Ashton-on-Ribble. July, 1896.

EXTERMINATION OF CUPIDO MINIMA (ALSUS) AT WITHERSLACK.—This species will soon be cleared out at Witherslack. Some years ago it swarmed there, but this year I only saw three specimens. A man from Bradford was on the bank, where it occurs, for a whole day, never leaving it (not even to go to the inn opposite for refreshment), he was so intent on a clearance.—IBID.

CAPTURE OF IMAGO OF JOCHÆARA (ACRONYCTA) ALNI.—Whilst collecting near Groombridge, Sussex, on the 1st of June, I was surprised to capture a fine male specimen of *Jochæara alni*, which I disturbed from grass.—H. W. ANDREWS, Victoria Road, Eltham.

FIRST APPEARANCE OF PYRAMEIS CARDUI.—The first and, up to date, only *Pyrameis cardui* observed this year, was seen on Saturday, June 27th, in a clover field near Wainscot, Kent. It was large, pale in colour, but the wings were perfect.—J. W. TUTT. June 30th, 1896.

UNUSUAL APPEARANCES OF SYRICHTHUS MALVÆ, EUCHLOË CARDAMINES AND ACONTIA LUCTUOSA.—*S. malvæ* was well out at the end of April, and was most abundant the first fortnight in May. On June 20th I caught a freshly-emerged specimen at Chattenden, and a worn one on June 28th, at Cuxton. Were these attempts at a second brood? I do not think so, somehow, as there really has been no real break in the continuity of the insect's appearance. Mr. Tunaley captured, on June 27th, a specimen of *Euchloë cardamines*, a species which, in confinement, and under the most favourable conditions, continues to emerge from pupæ which have gone over the winter, for about three months, viz., last week in March until middle of June. *Acontia luctuosa*, of which the early brood was well out at the end of May, was captured in good condition on June 28th. This must have been a straggler of the early brood, for even in the environs of Paris, the last week of July is early for the second brood.—J. W. TUTT.

A DAY AT OXSHOTT.—On June 13th, 1896, the members of the North London Nat. Hist. Society made an excursion to Oxshott. Messrs. Bishop, Lovis, Prout and C. Nicholson, caught the 9.35 train from Waterloo, arriving at Oxshott at about 10.30. On crossing the railway bridge to Esher Common, Mr. Lovis espied a freshly-emerged specimen of *Choerocampa porcellus*, at rest on a small plant. Almost simultaneously Mr. Prout took a specimen each of *Aspilates strigillaria* and *Acidalia subsericeata*. Further specimens of both these species were taken during the day, the former being quite common and in fair condition. On proceeding over the heath, several *Anarta myrtilli* were seen, but not captured. A pine wood produced *Bupalus piniaria* and *Ematurga atomaria*, both species being in a mixed condition, some perfect, others wrecks. Mr. C. Nicholson took a fine specimen of the very local *Tortrix piceana*. Some half-dozen specimens of *Elloppia prosapiaria* were found at rest on the pine trunks, which were tenanted on the "fagella" system by *Scoparia ambigua*, of which 15 were counted on one tree, so abundant was the species. Numerous specimens of *Agrotis exclamationis*, *A. segetum* and *Tryphaena pronuba*,

were disturbed from the heath, etc., the first specimen of the latter causing some commotion through its strongly resembling one of the larger BOMBICIDÆ. The fence round Claremont Park was then searched, with no result worth mentioning, except the capture of a lovely specimen of *Erastria fasciana*. Single specimens of *Pamphila sylvarum*, *Syrichthus malvæ* and *Nisoniades tages*, were seen flying together in one spot, and all in good condition. The party returned to the station to meet the 2.17 from Waterloo, and were joined by Mr. W. H. Smith, who had travelled by the 12.35. The party was now increased to 13, by the advent of Mr. and Miss Battley, Miss M. E. Robinson, and Messrs. R. W. Robbins, Woodward, C. S. Nicholson, Bacot and C. B. Smith; and proceeded to spread over the heath once more, with the result that several *Anarta myrtilli* and *Lithosia mesomella*, amongst other species, were captured. At 5.30 the party adjourned for tea to the Queen Victoria Inn. After tea, the members proceeded to the Black Pond. Mr. Robbins found a fine male specimen of *Stauropus fagi* at rest on a trunk in the middle of a pine wood, where larvæ of *Panolis piniperda* fell pretty freely to the beating-stick. Mr. C. Nicholson took a specimen of *Eupithecia indigata*, in worn condition, and Mr. Robbins also captured two "Pugs," which may or may not be the same species, their condition being hopeless. Some of the members saw Stagbeetles flying in their usual steady way, at about 12 ft. from the ground. Messrs. Bishop, Bacot, C. S. Nicholson and Prout, returned by the 7.37 train, the rest by the 9.25. This excursion was one of the most enjoyable which the Society has ever held, and it was by far the most successful, entomologically, of those held during recent years.—LAWRENCE J. TREMAYNE.

SPRING COLLECTING IN THE DONCASTER DISTRICT.—This season differs widely from last, so far as collecting goes. Last year, sugar was very good, and Micro larvæ very scarce. The contrary is the case this season. I have sugared regularly from May 25th up to July 5th, and have not had one really good night. The only decent species that have occurred have been a few *Neuronia reticulata* and *Hadena dissimilis*, but these have been few and far between. Of Micro larvæ, I have got a fair number. *Sciaphila sinuana*, I have succeeded in breeding again from larvæ taken during May. *Laverna raschkiella* and *Lithocolletis cerasicolella* are now about full-fed, and I hope to get a fair number out. During May, the larvæ of *Arctia caia* were very plentiful. This is really a rare insect here. About the middle of June I collected some leaves of aspen, rolled up like cigarettes, and from these have emerged (besides a number of *Tortrix viridana* and *T. ribeana*) a few *T. branderiana*. This is a new record for the West Riding.—H. H. CORBETT, M.R.C.S., Doncaster. July, 1896.

TRYPHLENA SUBSEQUA IN JUNE.—I took four *Tryphaena subsequa* last night (June 21st), the first this year. I almost mistook the first one I saw for *Tryphaena ianthina*. I cannot understand this species being ever passed over as *T. orbona* (*comes*), the fore-wings are so much more marbled than those of southern *T. orbona*, and the black spot is so very conspicuous on the costa. There is often also a whitish shading in places, another similarity to *T. ianthina*.—W. M. CHRISTY, M.A., F.E.S., Watergate, Emsworth, Hants. July, 1896. [Is this species double-brooded? It appears to occur regularly on the coast of the Isle of Wight, in September and October.—Ed.]

RANNOCK AT EASTER.—I spent Easter week at Rannock, when insects were much scarcer than they were last year at the same time. Sallows produced *Taenioampa instabilis* in variety, *T. gothica*, some very nice forms, *T. populeti* was somewhat scarcer. *Calocampa vetusta* and *C. eroleta* were in swarms on the tree-trunks at night. *Lobophora carpinata* (*lobulata*) was uncommon; very few of the banded forms occurred, however, whilst I was there. *Asteroscopus nubilosus* was rare.—J. J. F. X. KING, F.E.S., 207, Sauchiehall Street, Glasgow. *July*, 1896.

A DAY AT SWANSEA.—I had one day in the woods here during the last week in April, and took *Lophopteryx camelina* (male and female, in copulá, from which I obtained ova). *Leiocampa dictaeoides*, *Tephrosia consonoria*, *T. punctulata* (common), *Nola cristulalis*, *Tephrosia bistortata* (*crepuscularia*), *T. crepuscularia* (*biundularia*), *Agrotis cinerea*, *Lobophora rivetata*, *Selenia lunaria*, *Cidaria silaceata*, *Hemcrophila abruptaria*, *Pararge megera*, *Brenthis euphrosyne*, *Polyommatus astrarche*, as well as *Acipitilia microdactyla*, feeding on *Eupatorium cannabinum*.—(Major) R. B. ROBERTSON, Royal Arsenal, Swansea. *July*, 1896.

TIME OF OVIPOSITION OF DEMAS CORYLI.—On May 17th I saw a female *D. coryli* ovipositing on a small beech bush, about 9 p.m.—A. F. BAYNE. *July*, 1896.

CAPTURE OF XYLOMIGES CONSPICILLARIS AT CASTLE MORETON.—I had the good fortune to capture a beautiful specimen of *Xylomiges conspicillaris*, on the evening of April 20th, off plum blossom.—(Rev.) E. C. DOBRÉE FOX, M.A., Castle Moreton Vicarage, Tewkesbury. *July*, 1896.

EFFECT OF THE UNUSUAL MAY WEATHER.—The extraordinary weather we have experienced has rendered collecting here quite unusual in many ways. Larvæ, which should normally be beaten half-grown during the latter part of May, were either full-grown or had already pupated, e.g., *Asteroscopus sphinx*, which I have tried to procure for May correspondents, owing to starting too late, I have found very scarce. *Zephyrus quercus*, too, were full-fed much earlier than usual. Many species, ordinarily very scarce here, have been comparatively common, e.g., *Selenia lunaria*, *Eurymene dolobraria*, *Drepana cultraria*, *Lobophora rivetata*. *Callophrys rubi* was very scarce, and during the first week of June, *Lithosia mesomella* was very abundant.—E. F. STUDD, M.A., B.C.L., F.E.S., Oton. *July*, 1896.

METHYLATED SPIRIT VERSUS RUM.—At such times as I have sugared, common Noctuides have been in abundance, and most conspicuous of these are remarkable aberrations of *Tryphaena pronuba*. I was rather surprised to find on the night of June 12th, both *Panagra petrarica* and *Hylophila prasinana* at the sugar, which was well scented with methylated spirit. I have tried it in the place of rum, but I cannot say I like it as well, from the fact that directly the light is thrown on the sugar the insects fly off, a habit not usual with rum, otherwise, I think spirit is more attractive.—E. R. BUSH, 71, Strathmore Street, Perth, N.B. *July*, 1896.

ABUNDANCE OF APHODIUS SORDIDUS.—Enclosed I send you a few beetles. I am not very curious about Coleoptera, but I was out on the night of June 18th, with the net for a few hours, when, just at dusk, I came across one of the most extraordinary entomological sights I ever

saw. On a path, I almost stepped on what I thought was a swarm of bees, but, on closer examination, I found it to be a seething mass of the enclosed beetles, struggling over some horse droppings. A couple of yards further on were two other patches, while the air for some distance around was filled with countless thousands on the wing. In four strokes of the net I caught a mass of them, weighing fully half-a-pound. The whizzing of the wings in the air produced a peculiar *screeching*, rather than humming sound. In a case like this it is difficult to avoid exaggeration, but I am confident that I am within the mark if I say I could have brought home a peck measure full of them; in fact, it was as I have said, like three large swarms of bees. The moon was shining at the time, and the reflection of the rays glistening on the thousands of elytra was very beautiful. — W. BOND SMITH, Potton, Beds. *August, 1896.* [In connection with the above, the following note on a "*Swarm of Geotrupes stercorarius*, L., at Poyntzpass," by the Rev. W. F. Johnson, is interesting: "On March 22nd, at about 7.30 p.m., two boys came to me, in a state of great excitement, to tell me that there was a swarm of beetles at the railway station. One had a large cardboard box, and the other his coat-pocket, full of the beetles. On examination they proved to be *Geotrupes stercorarius*. I was at the railway station the next morning, and, on the pathway and road, were numbers of the beetles, dead, where they had been trodden on by the people on the previous evening" (*E.M.M.*, xxxii., p. 158). Mr. Johnson suggests that the abundance of the beetles was due to the presence of a large quantity of cowdung at the station, from the cattle that are removed by rail, after a large monthly cattle-fair which had been held at Poyntzpass.—ED.]

We sent the beetles forwarded to us by Mr. Bond Smith to the Rev. W. W. Fowler, who kindly determined the species, and writes as follows :—

"The beetle is *Aphodius sordidus*, Fab.—of all shades of colour. I thought there were two or three species, but on closer examination have found only one. It is by no means a common species, as a rule, but nearly all the *Aphodii* simply swarm in hot weather, when they occur at all. Perhaps the atmospheric conditions have produced a larger swarm than usual."—(Rev.) W. W. FOWLER, M.A., F.L.S., F.E.S., The School House, Lincoln. *July, 1896.*

PANCHLORA MADEIRE IN BERNMONDSEY.—This large and probably imported Orthopteron was figured by Mr. C. A. Briggs, in the June number of *The Entomologist*, and that gentleman suggested that the two specimens were introduced in cases of bananas, both being captured in Covent Garden. On June 16th, a specimen was brought to me by a boy named Frank Evans, which he had captured, with the usual schoolboy apparatus of "hand and cap," in the gutter of Newcomen Street, S.E. An inspection of the vicinity revealed a fruiterer's shop, with the regulation barrow outside. The Borough Market is not far removed. I gave the specimen to Mr. J. W. Tutt, who exhibited it at the meeting of the City of London Entomological Society, on Tuesday, June 16th. It is now in the possession of Mr. J. A. Clark, in whose collection it may be seen.—A. S. HEPDEN, Webb Street Board School, Bermondsey, S.E. *July, 1896.*

PRACTICAL HINTS.

Field Work for August.

By J. W. TUTT, F.E.S.

1.—In August, the stems of *Stachys palustris* (occurring in marshes and fens) should be collected for larvæ of *Antithesia carbonana*.

2.—At the end of August or beginning of September, the larva of *Eucosmia undulata* is to be found feeding in a silken web on the upper surface of leaves of willow. As it gets older it spins two or three leaves together.

3.—The spun terminal twigs of osiers should be collected during the second week of August for the larvæ of *Earias chlorana*. Securely enclosed in a band-box, they will pupate without further trouble.

4.—During the first fortnight of August, search carefully the seedling plants of lettuce in gardens. The variable larvæ of *Hecatera dysodea* will be found stretched at full length, during the day, on the blossoms and seedheads.

5.—In August, search the flowers of *Solidago virgaurea* for a Pyralid larva, living in a slight web. You will probably thus obtain the caterpillar of *Botys terrealis*.

6.—During August, the larvæ of *Pionea margaritalis* are to be found (often two or three together) under a web among the seed-heads of *Sinapis alba* and *S. arvensis*. They are best found, however, by night, when they are feeding on the seed-pods. Those plants found near growing corn are most frequented.

7.—In August and September the larva of *Pelurga comitata* is usually abundant on *Chenopodium*. We used to get immense numbers of this, and the larva of *Eupithecia subnotata*, on Greenwich marshes, by shaking the plants at night.

8.—In August and September the berries of the spindle tree should be examined for larvæ of *Nephopteryx angustella*. Frass protrudes from the hole through which the larva enters the berry. A supply of rotten wood for the larva to pupate in is very necessary.

9.—The seed-heads of *Pimpinella saxifraga* give larvæ of *E. pimpinellata* in August and September.

10.—The larva of *Cymatophora fluctuosa* is to be found by searching or beating birches in August and September. It still occurs in Darent Wood.

11.—About the middle of August, search the upright stem of *Epilobium* for a swelling near or at one of the joints. Within it the pupa of *Lacerna decorella* is to be found.

12.—The pods of *Astragalus glycyphyllos* should be collected in August for larvæ of *Stigmonota pallifrontana*.

13.—The flower-heads of *Knautia arvensis* should be collected in August for larvæ of *Eupoecilia flaviciliana*.

14.—In August and September the larvæ of *Nephopteryx splendidella* feed on the cones of spruce fir (*Abies excelsa*). The larvæ pupate in rotten wood in September, and emerge the following year.

15.—In August and September the larvæ of *Eupoecilia degreyana* feed in the seed-pods on the unripe seeds of *Linaria vulgaris*.

16.—In August and September, the larva of *Nepticula woolhopiella* mines in birch leaves. This was successfully bred by Dr. Wood, who supplied the larvæ with earth, and kept them out of doors all the winter.

17.—The cases of *Coleophora adjunctella* are to be found during August and September, in salt marshes, on the seed-heads of *Juncus gerardi*.

18.—The first fortnight in September is the time for the larva of *Cosmopteryx schmidella*, which whitens the leaves of *Vicia sepium*.

19.—The flowers of *Solidago virgaurea*, *Eupatorium cannabinum*, *Angelica sylvestris* and *Scabiosa succisa*, should be beaten into an umbrella, in August, for *Eupithecia* larvæ.

20.—The larvæ of *Eupithecia satyrata* var. *callunaria* may be obtained in August and September, by sweeping the flowers of *Calluna vulgaris*.

21.—The larvæ of *Nepticula minusculella* may be bred from pear leaves collected in August.

22.—The second week in August is the best time to capture *Agrotis agathina*. "The best plan to capture it is to light the lantern, and watch the places among the heather which are partly sheltered with trees. The insect appears to fly for about a quarter of an hour briskly over the heather, after which it settles for half an hour or so, during which time it may be found on the heather bloom; the slightest shake, however, causes it to fall like a stone, when it is usually lost. After this half-hour's rest it flies again, and must be taken with the net and lantern. This period yields by far the greatest number of moths" (G. Norman).

23.—The larvæ of *Spilodes pulealis* are to be found at the end of August, feeding on the umbels and flowers of *Daucus carota*.

24.—The cones made by larvæ of *Gracilaria phasianipennella*, on *Polygonum hydropiper*, are to be found in the middle of August.

25.—At the end of August the larvæ of *Eupithecia frarinata* may be beaten out of ash.

26.—The larva of *Anesychia fiterella* is to be found feeding on comfrey at the beginning of August.

27.—In the middle of August collect the twisted willow and poplar for larvæ of *Peronea hastiana*.

28.—Rolled up leaves of *Viburnum lantana* should be collected in August for larvæ of *Peronea tristana*.

29.—The larva of *Eupithecia helveticata* feeds on juniper in August and September.

30.—Refer to *Ent. Rec.*, vol. i., p. 141 (No. 5), for a series of "Practical Hints" on "Field work for August," by Mr. J. Mason, and to the *Ent. Rec.*, vol. i., p. 164 (No. 6), for another series on "Field work for September," by Mr. W. G. Sheldon.

REVIEWS AND NOTICES OF BOOKS.

BUTTERFLIES.—By W. F. Kirby, F.L.S., F.E.S. [Published by Edward Lloyd, Ltd., London. Price 6d. per part].—I should like to offer a few remarks on Part III. of *Lloyd's Natural History*—"Butterflies"—which is being compiled by Mr. W. F. Kirby, F.L.S. (1) Mr. Kirby, on p. xviii, writes:—"Most eggs of Lepidoptera are semi-transparent, and as they approach maturity the young larva can often be seen coiled up inside. Some eggs are provided with a kind of lid, which the larva pushes off when about to emerge." On

pp. xix-xx, Mr. Kirby himself shows that only two out of seven groups, into which the butterflies are divided by egg characters by Doherty, are semi-translucent, all the others being opaque, and it is well known that the eggs of many moths are opaque. What, too, is the "kind of lid" to which Mr. Kirby refers? (2) Mr. Kirby says (p. xxi.), that "true caterpillars never have more than *sixteen legs*." Have any insects more than six legs? (3) On p. xxix, we read:—"Caterpillars are very voracious, and increase in size very rapidly; but as their *skin does not expand in proportion, it soon becomes too tight*. Then the caterpillar moults." Is not the cause of moulting an excretory function (See Sharp, *Cambridge Nat. Hist.*, pt. v., Insects, p. 162)? (4) "On emerging from the pupa state, butterflies and moths usually discharge a fluid *from their mouths*; and when they have been unusually abundant, the phenomenon has sometimes been imagined by the ignorant to be due to a rain of blood, for this fluid is frequently of a red colour. When a moth emerges from the pupa *this fluid serves to soften the threads of the cocoon*" (p. xxxiii.). Is not the fluid which newly-emerged moths and butterflies sometimes discharge, evacuated from the anus? and is not the fluid with which pupæ soften their cocoons an acid secreted by head or prothoracic glands? How can a fluid come from the mouth of a butterfly or moth, considering its structure? (5) On p. xxxiii, we read that "Some moths are furnished with a *strong spine under the wings*, which they employ to saw through the silk." What is the nature of this spine, and how is it used? On p. xxxiii, "When a butterfly or moth emerges from the pupa . . . at *first fluid and then air* is forced through the nervures of the wings." Is a fluid ever forced through the nervures (*vide, Ent. Rec.*, vol. ii., p. 101)? And again, in p. xliii, we read, "The wings of insects are traversed by hollow tubes, which are technically called nervures, and which serve, *first as circulatory organs for the fluid*, which is forced through the wings on the emergence of the insect from the pupa, and thus causes their expansion and development; and *afterwards as air-tubes*." Surely the fluid that expands the wings is forced between the upper and lower membranes of the wing, and has nothing to do with the nervures at all? (7) We read again, on p. xxxiii, that "The body (of butterflies and moths) is divided into three principal parts, called respectively the head, thorax, and abdomen, each of which is connected with the next by a *narrow pedicel*." Has the writer ever observed these pedicels between the head, thorax and abdomen of *Sphinx convolvuli*, *Notodonta ziczac*, *Geometra papilionaria*, *Noctua rubi*, *Hypana proboscidalis*, et cetera? (8) On p. xxxiv., we also read "Between the eyes are placed the *ocelli*, or single eyes, on the summit of the head. In moths, there are always two, when they are present at all, but in butterflies, and many genera of moths, they are entirely absent. Their presence or absence forms a generic character of importance among the moths." Have moths really these ocelli? Will Mr. Kirby give your readers a list of those that have? (9) "The long net used by the old collectors for catching the Purple Emperors (a net on a pole *twenty or thirty feet long*) is now rarely used" (p. l.). Has Mr. Kirby ever looked at a stick thirty feet long, and attempted to work out the improbability of its use at any time? (10) "Insects pinned in the field are put into small *wooden boxes lined with cork, and carried in the pocket*." Who does this?

Would the insects not dry up, and have to be relaxed? Most collectors of my acquaintance use zinc boxes, in which the cork has been well damped.

Mr. Kirby had a rare chance given to him to write a book for "the man in the street." The advertisement which Edward Lloyd, Ltd., is able to afford will carry the book into more humble homes than any other book of a similar nature will have ever before reached. Is it too much to ask that "the man in the street" have correct, if simple, instruction imparted to him, and that such instruction be up-to-date, and not derived from quotations, two, three, and four pages in extent, from Duncan's book, published—well, just a few decades ago?—J.B.

SOCIETIES.

SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—On May 28th, Mr. McArthur exhibited INSECTS FROM HOY, as follows:—A bred series of *Hyppipetes ruberata* and *H. trifasciata*, which as imagines were inseparable; the latter species was reared on heath; *Eupithecia renosata*, *E. pulchellata* and *Melanippe fluctuata* var. *neapolisata*. Also specimens of *Chrysomela arvensis* and *C. sanguinea* (from Hoy), with *C. distinguenda* from the South of England, for comparison with the local northern *C. sanguinea*. Mr. Edwards: a twig of fir containing the nodule and LARVA OF TORTRIX PICEANA, from Brockenhurst. In reporting on the FIELD-MEETING AT BROCKENHURST, Mr. Edwards said that imagines were more plentiful than last year, and that larva-beating was very successful. The weather was fine, and some twelve members were in attendance during the three days. *Macroglossa fuciformis* and *M. bombyliiformis* were both captured. Larvæ of *Limenitis sybilla*, *Catocala promissa*, *C. sponsa*, *Taeniocampa mintosa*, *Spilosoma mendica*, *Zephyrus quercus* and *Z. betular*, were among the species found. On June 11th, Mr. Lucas exhibited specimens of the following ODONATA:—*Ichnura elegans*, *Pyrhosoma minium* and a series of *Platetrum depressum*, including a male which had not developed the blue colour characteristic of the sex. They were taken by Mr. Turner, at Folkestone, on May 17th. Mr. Barrett exhibited a very large and dark SPECIMEN OF MAMESTRA ABJECTA, and a beautiful var. of the same, having all the markings clear and distinct upon a light ground; a var. *remissa* of *Apania gemina*, and a specimen of *Hadena genistæ*, to both of which the var. of *M. abjecta* was comparable in many respects. Mr. N. D. Warne, KESWICK INSECTS, including a series of *Procris statice*, and a few specimens of *Emmelsia adaequata* (*blandiata*), one of which had the central band almost complete. Mr. Tunaley: a SPECIMEN OF EMPIS TESSELLATA, having in its grasp a *Tipula*, which it had captured. The middle legs of the *Empis* clutched the shoulders of the wings of the *Tipula*, the hind-legs were bent under the wings and body, while the fore-legs of the *Empis* were free to grasp any support. The *Tipula* was thus held as if in a vice, and some of the individuals thus seized not infrequently lost one or more of their legs in the struggle. The *Empis* repeatedly pierced the thorax of the *Tipula* with its lancet, but was not always successful,

owing to the struggles. This could easily be observed if the insects were placed together in a small box. He also exhibited an ASYMMETRICAL FORM OF *COREMIA DESIGNATA* from Rammore, having the band of the right primary narrower than usual, and filled in completely with the dark colour. The inner margin of the band was more straight than in normal specimens. Mr. Mansbridge: an ABERRATION OF *SYRICHTHUS MALVÆ*, having a notch at the apex of all the wings in which the cilia were present, but shorter than usual. A discussion ensued, some members considering it to be caused by an injury to the pupa, and others thought that the cilia were shorter than usual, and that the proximity of the white patch somewhat accentuated the appearance of the notch. Mr. Edwards, a specimen of the rare *Papilio danisepe* from the Khasia Hills, and a short series of *Leptocircus curius*. He then read a few NOTES ON THE VERY ABERRANT GENUS OF THE PAPILIONINÆ—*LEPTOCIRCUS*. After enumerating the species, and stating the characters by which it differed from the other genera of the family, he described its distribution, and quoted the opinions of various collectors that the species were mimics of a species of Neuroptera, both in their appearance and habits.—On June 25th, Mr. West, of Streatham, exhibited a bred series of *HYPsipETES RUBERATA*, containing uniform and banded specimens, and a SPECIMEN OF *TROCHILUM CRABRONIFORME*, bred from an osier stem, cut at Streatham, in expectation of obtaining *Sesia formicæformis*. Mr. R. Adkin: a bred series of *EUPITHECIA VENOSATA* FROM HOY, with series from Shetland, Forres, and I. of Man, for comparison, and noted that the Orkney ones were of a browner shade, while the I. of Man specimens were like S. of England netted forms; also FULL-FED LARVÆ OF *CALOCAMPA VETUSTA*, reared on dock, from Invernesshire ova. Mr. Barrett: A series of the rare *OSMYLUS CHRYSOPS* FROM HASLEMERE. Mr. South: types of the ABERRATIONS OF *SPILOSOMA MENTHASTRI*, obtained from a brood of the insect from Aberdeen. Several were smoky, one had dark fringes, in another the edges of all the black markings had run in appearance. Mr. McArthur: the five most remarkable FORMS OF *ABRAXAS GROSSULARIATA*, bred this year from some 3,000 larvæ. In one the black, external to the yellow band, was almost entirely suffused, another was slightly smoky, and the spots had the appearance of having run; a third had the fore-wings almost entirely black, with the outer half of the hind-wings wholly black; another had the hind-wings with a narrow black border, from the middle of which a wide streak ran into the centre of the wing. The smoky form was remarked as being very rare. Mr. Dennis: a series of *CÆNONYMPHA TYPHON* FROM N. LANCASHIRE, taken early in June. The specimens had very pure white markings underneath, referable to var. *rothliebii* (= *philoxenus*, Esp., vide ante, vol. vii., p. 107, for proper use of this varietal name.—Ed.). Also he exhibited several very brilliant *Cyaniris argiolus* from Horsley, of a shade approaching that of *Polyommatus bellargus*. Members reported that *LIMENITIS SIBYLLA* was flying in the New Forest early in June.

CITY OF LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—June 16th, 1896.—Exhibits:—Mr. Tutt: OVA OF *TROCHILUM CRABRONIFORME*, sent by Dr. Chapman. He distributed some of the eggs, which were laid on the underside of willow-leaves, near the mid-rib; he suggested that the larva probably mines the leaf or young shoots

at first, and gradually works its way into the twigs and branches, on the wood of which it afterwards feeds. He also showed an EXAMPLE of *PANCHLORA MADEIRÆ*, which had been found in Bermondsey, by a boy belonging to the Webb Street Board School. Mr. Nicholson: a living PAIR OF *RAPHIDIA OPHIOPSIS*, and ova, from Epping Forest; also two SPECIMENS OF *TORTRIX PICEANA*, from Oxshott. He also showed ova, which he supposed to be those of *Dianthoecia capsicola*; they were found on the FLOWERS of *Ixchois respertina*, growing in his garden at Clapton, and, when first laid, were very pale yellowish-white, changing gradually to the shade of brown assumed by the flower when withered. Mr. J. A. Clark: three ♂ SPECIMENS OF *CYANIRIS ARGIOIUS*, from Epping Forest; one of them having the wings on the left side of a dingy, silvery greenish-blue colour, rather like that of *Polyommatus corydon*: the right pair of wings were normal. Mr. Bloomfield: a LIVING SPECIMEN OF *THECLA W-ALBUM*, bred from a larva captured in Suffolk a few weeks previously. Mr. Pearson: a LARVA OF *ZEPHYRUS BETULÆ*, taken in the New Forest; the specimen was evidently nearly full fed. Mr. Bacot: a SERIES OF *LOPHOPTERYX CARMELITA*, bred from ova obtained from Mr. J. A. Clark, and read the following notes:—"The ova were received on May 16th, 1895, and had already commenced to hatch. The eggs are opaque white, with a very slight greenish tint of the usual Notodont shape (rather less than half a sphere). LARVÆ:—May 17th, 1ST SKIN.—Pale whitish green. Head very large, rounded, polished surface. Scutellum large, but indistinct. Skin of larvæ much wrinkled, but smooth and shiny; tubercles bear one simple hair, about $\frac{1}{3}$ thickness of body in length. Drops on a thread if it loosens its hold. May 26th, 2ND SKIN.—Bright yellow-green. Scutellum plain. Head slightly notched at crown. June 8th, 3RD SKIN.—Transparent green. Head not so rounded in shape. A series of seven bright yellow or yellow-green longitudinal stripes on dorsal area, and a broad well-marked lateral stripe. June 9th, 4TH SKIN.—Head is small, when well grown, in this stage it is dull, pale green, with two pale yellow stripes down face. The body is very broad in middle, and tapers towards head and anus. The lines on dorsal area are still present, but are much interrupted, lateral stripes very plain. There is a pale pink spot or blotch on each segment, just behind the spiracles; these spots are present on the meso- and meta-thorax, where the spiracles are absent. Spiracles, black. Ventral area, whitish-green, dusted with white. On the 23rd June I made a note to the effect that the larvæ were going down. The larvæ were fed up indoors under a bell-glass, supplied with fresh birch twice a week, and when about to pupate were placed in a flower pot, partly filled with earth, covered with moss. They went through the moss, and spun their cocoons on the surface of the earth. The cocoons were rather tough, the silk being mixed with small particles of earth, moss, etc. The pupæ were kept out of doors during the winter, and emerged (I am sorry to say I did not note the exact dates) in April, the 19 emergences being spread over about 10 to 14 days (I had fertile ova by the 12th). As to the time of day at which they emerged, I have only my memory to rely upon. Some were out expanding their wings from 8 to 9 a.m., others were later in the day, after I had started for the City. July 7th, 1896.—Exhibits.—Mr. Bacot: a larva in its third skin, being one of a brood hatched from eggs resulting from a pairing

of a ♂ *Smerinthus ocellatus* and a ♀ *S. populi*. When very young, the larvæ strongly resembled *S. ocellatus* in the corresponding stage; but at present they were much closer to *S. populi*; they, however, resembled *S. ocellatus* in the fact that the third oblique stripe was not more conspicuous than the others. Dr. Sequeira: *Anticlea sinuata* (2), *Phibalapteryx lignata*, *Meliana flammea*, *Plusia festucae* and its ichneumon, *Macrogaster castaneæ* (♂), *Papilio machaon*, with the linear black mark at the apex (lower end) of discoidal cell, with a yellow centre, *Nascia ciliaris*, and other species taken at Wicken Fen during the first week in June. Mr. Prout: a variable series of *Dyschorista suspecta*, bred from a mottled female taken at Wimbledon. Mr. Bate: *Cymatophora duplaris* from Dulwich, taken last June. Mr. E. Heasler: *Acrionicta leporina*, *Moma orion*, *Plusia pulchrina*, from the New Forest, at Whitsuntide, and Mr. S. J. Bell: *Nola strigula* and *Triana psi* from the same locality.

THE NORTH LONDON NATURAL HISTORY SOCIETY held a meeting on June 11th, 1896, when the following exhibitions and remarks relating to COLLECTING DURING THE PRESENT SEASON were made. Mr. Quail: *Agrotera nemoralis* and *Acipitilia tephrodactyla*, taken near Herne Bay. Mr. L. J. Tremayne: a series of *Taeniocampa pulverulenta*, from Epping Forest. Mr. Simes reported that Mr. A. C. Smith had been taking *Melitara cinria* in plenty at Guernsey. Mr. Battley gave an account of a trip to Northamptonshire at Whitsuntide, when he captured *Carterocephalus palaemon*, and larvæ of *Thecla pruni*, *T. w-album*, *Zephyrus betulae*, *Asteroscopus sphinx*, *Trichiura crataegi*, etc. Messrs. R. W. Robbins and L. B. Prout recorded *Zonosoma annulata*, *Acontia luctuosa*, *Scoria lineata*, and larvæ of *Saturnia paronia* (feeding on oak), from North Kent. Mr. Prout also recorded *Setina irrorella*, *Acidalia ornata* and *Anaitis plagiata*, the latter in great abundance, among St. John's Wort (*Hypericum*), on the preceding Tuesday, at Box Hill. Mr. Jennings recorded the addition of twenty-eight more species to the local Diptera. He had also met with *Mintho praeceps* and *Merodon equestris*, which occurred rarely last year. To the local list of Aculeate Hymenoptera, he had added several species, amongst them, *Mocleeta armata*, one of the parasitic bees, which he had taken from the burrows of *Anthophora filipes*, in Epping Forest, in April. Mr. Bacot read the following NOTES ON THE GENUS *SMERINTHUS*:—"I have lately been assembling the species of *Smerinthus* in my garden at Clapton. On the 7th I took four *S. tiliac*, between 8.50 and 9.25 p.m. With *S. populi* and *S. ocellatus*, I find it necessary to place the ♀ on a bush or to leave the cage open, when a ♂ will usually be found *in cop.* with the ♀ by the next morning. The ♂s of these species do not, so far as my experience goes, assemble till after midnight, probably just before dawn. I think I have at last hit upon a reasonable explanation of the eye spots on the hind-wings of *S. ocellatus*. If the moth is disturbed when resting, it raises its fore-wings and suddenly exposes the eyes. The effect is rather startling, and is probably effective in scaring any small bird that might interfere with it. In breeding *S. tiliac*, I have found that, though the larvæ, up to about the third moult, do very well on the fresh young shoots of the lime, they require less succulent food after this moult, and thrive

best on the smaller dark green fleshy leaves from the top or upper branches of the tree."—At the meeting of June 25th, Mr. C. Nicholson exhibited a specimen of *Bombyx quercus* var. *callunae*, and some of her descendants, also other insects from Pwllheli, viz., *Calocampa retusta*, *Emmelesia affinitata*, *Lithosia griseola*, *Emmelesia decolorata* and *Melanippe unangulata*. Mr. Battley: specimens of *Carterocephalus palaemon*, *Craniophora ligustri*, *Cidaria silaceata*, etc., from Northamptonshire. Mr. R. W. Robbins: larvæ of *Dianthoecia capsicola* and *D. carpophaga*; and imago of *Sesia myopaeformis* from Clapton. Mr. L. J. Tremayne drew attention to the recent discussion in the Entomological Society of London, on the question of over-collecting in the Lepidoptera, which resulted in the formation of a committee to inquire into the matter, and moved the following resolution, which was seconded by Miss Nicholson, and carried *nem. con.*:—"That this Society heartily approves of the action of the Entomological Society of London, in appointing a committee to deal with the question of over-collecting in the Lepidoptera, and will be pleased to support the Society in any action they may think fit to take in the matter."

The Synonymous Sighs of Simplex.

It is a fact that

"A little nonsense, now and then,
Is relished by the wisest men."

Why, then, should not the entomologist sometimes turn poet? And if not, why not? Therefore, without further delay, I beg to place before you the following doleful ditty, respectfully dedicated to the "Fellows of the Entomological Society":—

The reed-maces gently were rustling,
The pond looked by no means too clear,
When, behold, with a wink in his eye,
Donacia simplex appear.

The errors of men he bewailed,
And bitter the tears that he wept,
For synonymies frequent and fearful
Had into the family crept.

"There's old *Donacia vulgaris*,
They've been and named him *typhae*;
And even good Father *limbata*,
They've gone and labelled *lemnæ*.

"Then *versicolora*, the rascal,
Called *bidens*, (he's cut a new tooth!)
Has thrown over poor Miss *baccata*,
Because she's called *nigra*, forsooth.

"And then, look at me, I am *simplex*,
I'm lengthy and coppery too,

So, perhaps, I may be *linearis*,
Though *semieupreca* will do.

"Misfortunes await *cinerca*,
For he's *hypochaeridis* now;
Menyanthidis is but a lame one,
He's *claripes*, clubfoot, I vow.

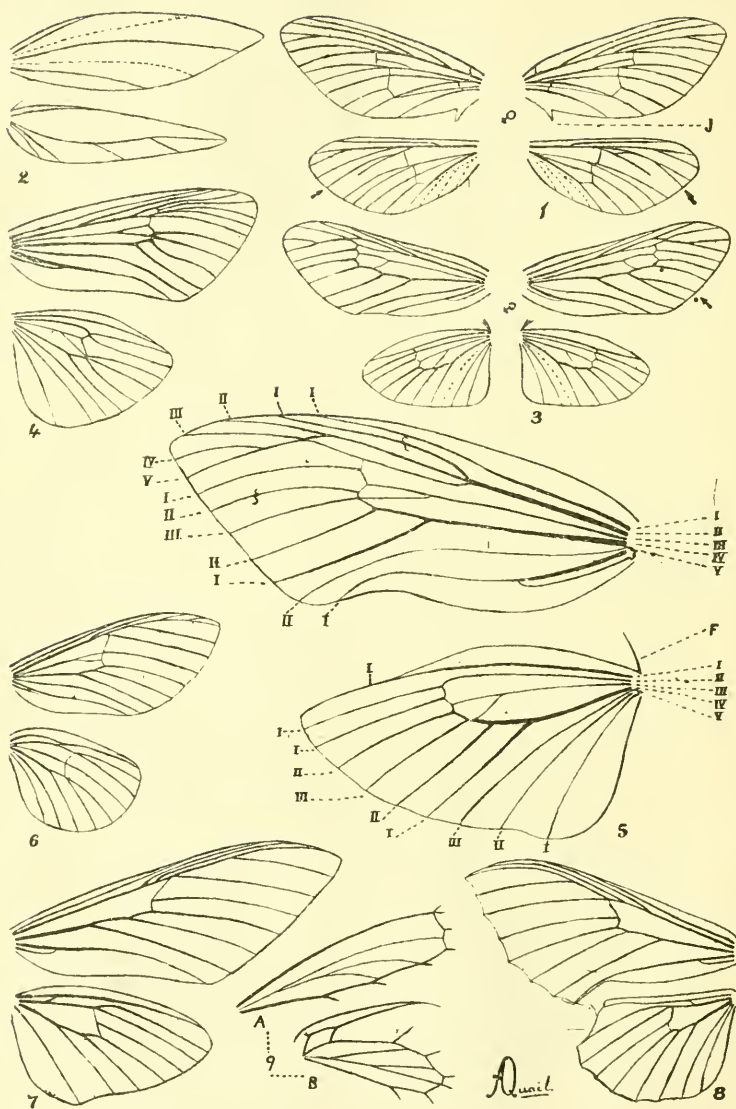
"*Sagittariae* now is *bicolor*,
His colour is still just the same;
Discolor, now called *comari*,
Delights in the change of his name."

Thus murmured *Donacia simplex*,
When, all in a moment, a net
To his murmurs and doubts put an end,
For the very next day he was set;

And being displayed on a card
In a box with a handsome glass top,
Beneath was his name, fine and large,
Simplex, F., *linearis*, of Hopp!

E.A.E. June 15th, 1896.

ERRATA.—p. 100, line 16, for "pupation . . . are" read "hybernation . . . is"; p. 104, line 14, for "that any, &c." read "than any, &c."; p. 105, line 10, for "an egg" read "a larva"; p. 106, line 26, for "latter" read "last."



NEURATION OF LEPIDOPTERA.

The Entomologist's Record

AND

JOURNAL OF VARIATION.

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Neuration in the Lepidoptera; the study of the wings, nervures, shapes, etc. (Illustrated by plate.)

By AMBROSE QUAIL.

The development of scales—which protect, and perhaps strengthen, the membrane—has probably had some influence upon the modification of the wing neuration (or system of nervures which strengthen the membrane). From the base of the wings rise five groups of nervures. These nervures sometimes give out branches which are called nervules. The five groups are respectively, see Pl. I., fig. 5 (1) Costal. (2) Subcostal or Radius. (3) Discoidal or Media. (4) Median or Cubitus. (5) Submedian or Anal. There is another nervure which forms the costa, or upper margin of the wings.

The system of numbering the nervures, by starting at 1 and finishing at 12 or 13, or whatever the total number may be, is useless, in so far as it does not explain the individual value of the nervures. On p. 18, *ante*, is an illustration of a system of numbering, “the veins numbered are in accord with the amended system, Redtenbacher—Comstock.” In this, the groups are represented by numbers, veins of the fore-wings numbered IV_1 and IV_3 are, however, distinctly attached to III and V nervures respectively, and are in point of fact (IV_1) III_5 and (IV_3) V_1 , for a reason that I will proceed to explain; the prefix IV indicates the ancestral value (or position) of those nervures.

It may be well here to give the synonymy of the nervures. The five groups of nervures, mentioned in the first paragraph of this article, are named as follows:—

I. KIRBY.—(1) Costal. (2) Subcostal. (3) Discoidal. (4) Median. (5) Submedian.

II. COMSTOCK.—(1) Subcostal. (2) Radius. (3) Media. (4) Cubitus. (5) Anal.

Personally, I consider the names used by Comstock much more appropriate than those used by Kirby, although the latter have probably been much longer in use.

Modification of neuration goes on in various directions, the radius, median, and cubitus groups become connected by transverse nervules, thus enclosing the median nervure, and forming the discoidal cell. By the strengthening of the radius and cubitus nervures, or, because it is useless (after the formation of the cell), the median (discoidal) nervure becomes weak, and is lost in the higher (most recently evolved) groups of Lepidoptera, although some retain faint traces of it. The median nervules, by a gradual alteration of position, are lost as such, and

become one by one, either radius or cubitus nervules. This alteration of position often causes one nervule to fork on to another, especially at the angles of the cell. In *Hepialus humuli* (Pl. I., Fig. 1) the hind-wings are asymmetrical in the position of the nervules, and illustrate how such forking occurs; some of the higher groups (*e.g.*, Nymphalids, etc.), after the loss of the median nervules, as such, also lose the transverse nervules which form the cell; sometimes a nervule coalesces with another, and they merge into one; sometimes a nervule becomes weak and is lost in the higher groups; the loss of any other nervule, besides the median, indicates a high modification. We may assume that modification of neururation in the Lepidoptera tends to a reduction in the number of nervures, and once lost, or the position altered, neither is ever regained. That an increase in the number of nervules does occur, Plate I., fig. 3, *Zeuzera pyrina*, proves. In this fig. the left fore-wing has the normal number of nervules, the right, however, has an increase of one; this may be an accident, or an attempt to throw back to an ancient number. On plate D, fig. 4^a, *Ent. Rev.*, vol. iv., is shown on abnormal increase in the number of nervules. The explanation of this seems to be that as nervules 3, 4 and 6 failed to reach the margin, the neururation, in order to support the membrane, developed branches from nervule 5, otherwise it is probable the wing outline would have been indented. Though I do not think an aberrational increase in number of nervures is ever transmitted to descendants, I intend to work up the subject.

From the foregoing it will be seen that the total number and position of the nervures is an important consideration, and I venture to give a system of numbering, by means of which our workers at special groups (Prout, Bacot, and others) could give a written description of the neururation of those groups, and show how far neururation agrees with the conclusion arrived at by other lines of study. The nervules should always be named and numbered from the nervule to which they are distinctly attached. Thus, a description of the neururation of *Cossidae*, fig. 5, would read as follows:—

† Costal or ‡ Subcostal.	Subcostal or Radius.	Discoidal or Media.	Median or Cubitus.	Submedian or Anal.
1	1.3.3.4.5*	1.2.3.	2.1	2.1 = 13 fore.
1	1	1.2.3.	2.1	3.2.1 = 10 hind.

This may be compared with the neururation of *Smerinthidi*, fig. 8, thus:—

† Costal or ‡ Subcostal.	Subcostal or Radius.	Discoidal or Media.	Median or Cubitus.	Submedian or Anal.
1	1.2.3.4.5*	1	3.2.1	1 = 11 fore.
1	1.2*	1	3.2.1	2.1 = 9 hind.

It will be observed that there is no median nervule in the fore and hind-wing, whilst S 1 and R 1 are connected in hind-wing, and it can be seen at a glance that *Smerinthidi* is the higher group. The fore-wing has one median nervule only, which remains at the end of the cell; two nervules then have been lost, as also the median nervule. The hind-wing has one median nervule only remaining, the radius has acquired one, and cubitus another, and one anal nervule is lost. It is, of course, only specialists in neururation who could say that radius 5 is

* ∨ Indicates a forking of two nervules. † Kirby. ‡ Comstock.

the ancestral median 1 of the fore-wing; not the specialist in Sphingides and one or two other near super-families.

In the super-family MICROPTERYGIDES, the wings are of similar shape, are narrow, and taper to a blunt tip, having, therefore, only two margins (upper and lower), and the jugum (Plate I., fig. 1, J). The neuration of all the wings is similar. It exhibits no discoidal cell as such, and the hind-wings have a greater number of nervules than any other lepidopterous group, except the HEPIALIDES, showing a close affinity between this group and the TRICHOPTERA (see also Dr. Chapman's "Evolution of the Lepidopterous Pupa," *Ent. Rec.*, vol. v., p. 25).

The members of the super-family HEPIALIDES have a jugum. The wings are all of similar shape, but are broader at the extremity than those of the MICROPTERYGIDES, forming another margin (the outer). The neuration is modified by the formation of the discoidal cell (Plate I., Fig. 1, *Hepialus humuli*).

Some individual amongst the earlier HEPIALIDES—which probably more closely resembled the MICROPTERYGIDES—developed the frenulum in place of the jugum (Plate I., fig. 5, F). As all the other groups possess the frenulum—except some of the higher, which develop an extension of the hind-wing base, and the Rhopalocera—they seem to have evolved from a common ancestor.

Those families which, in shape of wing, neuration, etc., most widely differ from the primitive ancestor (which, as already inferred, had narrow wings, and all of similar shape) logically seem to be the higher families.

Thus of the groups possessing the frenulum, the super-family TINEIDES (genus *Tinea* and its allies) has probably the most primitive wing-shape and neuration; how unnatural the old group TINEINA was, neuration—on the argument that modification tends to reduce the number of nervules—clearly shows. *Lyonetidae* (fig. 2) is very highly specialised, whilst *Elachistidae* also takes a high position.

The super-family PTEROPHORIDES has also a highly specialised wing-shape.

In the super-family TORTRICIDES (including *Tortrix*, *Cossus*, etc.) the family COSSIDÆ has a high wing-shape, but the neuration places it as a low group, whilst *Zeuzera pyrina* (Plate I., fig. 3) belongs to an earlier super-family (ZEUZERIDES) than that to which *Cossus ligniperda* (fig. 4) belongs. This is evident from the alteration of position of the median nervules of the fore and hind-wings, and other details, as well as the somewhat broader wings of the latter. The super-families, which are more highly specialised than the *Cossidae*, are the SPHINGIDES, BOMBYCIDES, NOCTUIDES, GEOMETRIDES and intermediate families. Thus *Stauropus fagi* (Plate I., fig. 6) represents the PSEUDO-BOMBYCIDES, and is intermediate—although highly specialised in larval characters—between TORTRICIDES (*Cossidae*) and SPHINGIDES, the members of the latter, by the way, appear to have two clearly defined sub-families, *Sphingidi* and *Smerinthidi*—illustrated by *Sphinx ligustri* (Plate I., fig. 7) and *Smerinthus populi* (Plate I., fig. 8).

In removing the wing scales from species of Rhopalocera, I was struck by the fact that they (the scales) appear to be more firmly connected to the membrane than are the scales of any other group. And although the neuration superficially—in fact, closely—resembles that of the BOMBYCIDES, near which the Rhopalocera is placed by Comstock,

Meyrick and others, the trace of the median nervure in the discoidal cell of certain species of *Parnassidi* (see fig. 9—A fore-wing cell, B hind-wing cell), clearly shows that it has not the remotest direct connection with any super-family above the family *Cossidae*, and, as there is no trace of a frenulum in the Rhopalocera, it probably originated separately about the same time as the frenulum branch. This, however, is merely a suggestion.

I have attempted to show in this article the value of neuration, etc., in studying the evolution of the Lepidoptera. Closer details of the neuration in the different groups must of necessity be dealt with in separate papers.

DESCRIPTION OF PLATE I.:—Fig. 1, *Hepialus humuli*, asymmetrical hind-wings; fig. 2, *Opotegea crepusculella*, an extreme form of neuration; fig. 3, *Zeuzera pyrina*, asymmetrical fore-wings; fig. 4, *Cossus ligniperda*; fig. 5, Type of Cossid neuration, an Australian species; fig. 6, *Stauropus fagi*; fig. 7, *Sphinx ligustri*, type of *Sphingidi*; fig. 8, *Smerinthus populi*, an extreme form of *Smerinthidi*; fig. 9A, Discoidal cell of *Parnassid* fore-wing; fig. 9B, Discoidal cell of *Parnassid* hind-wing.

MIMICRY.

V.—THE ORIGIN OF LEAF-MARKINGS AS A MIMETIC PATTERN.

By J. W. TUTT, F.E.S.

We have already learned that the imitation of leaves is a special adaptation, by means of which many insects are protected against their enemies, and it is of importance to notice that this sort of imitation is by no means restricted to a few genera, still less to a few species. All the species of the genus *Anaca*, which are distributed over the forests of tropical South America, the species of the American genera, *Hypna* and *Siderone*, the Asiatic *Symphacra*, the African *Salamis* and *Eurypheme*, exhibit this striking form of protection. Weismann says that he has observed fifty-three genera in which it is present in one, several, or in many species, but there are a great number of others.

As Weismann points out, "these genera are by no means all so nearly allied that they could have inherited the leaf-markings from a common ancestral form. They belong to different continents, and have probably, for the most part, assumed their protective coloration themselves. But one resemblance they have in common—they are all forest-butterflies. Now, what is it that has put so many genera of forest-butterflies, and no others, into positions where they could acquire the resemblance to leaves? Was it directive formative laws? If we closely examine the markings by which the similarity to the leaf is determined, we shall find, for example, in *Kallima inachis* and *paralekta* (*paralekta*), the Indian leaf-butterflies, that the leaf-markings are executed in absolute independence of the other uniformities governing the wing."

Weismann's description of the markings of the underside of *K. paralekta* reads as follows:—"From the tail of the wing to the apex of the fore-wings, runs, with a beautiful curvature, a thick, doubly-contoured dark line, accompanied by a brighter one, representing

the mid-rib of the leaf. This line cuts the 'veins' and 'cells' of the wing in the most disregardful fashion, here in acute, there in obtuse angles, and in absolute independence of the regular system of divisions of the wing, which should assuredly be the expression of the 'formative law of the wing,' if that were the product of an internal directive principle. But, leaving this last question aside, this much is certain with regard to the markings, that they are dependent, not on an *internal*, but on an *external* directive force."

This is the first occasion in which Weismann states distinctly that he is dealing with an "external directive force." Had he been as explicit throughout his paper, there would have been no fault to find. There will be found few, at any rate, to disagree with this, we venture to think. It appears to us that the "directive force" must be an external one.

Weismann then continues:—"Should anyone be still unconvinced by the evidence we have adduced, let him give the leaf-markings a closer inspection. He will find that the mid-rib is composed of two pieces, of which the one belongs to the hind-wing and the other to the fore-wing, and that the two fit each other exactly when the butterfly is in the attitude of repose, but not otherwise. Now, these two pieces of the leaf-rib do not begin on corresponding spots of the two wings, but on absolutely non-identical spots. And the same is also true of the lines which represent the lateral ribs of the leaf. These lines proceed in acute angles from the rib; to the right and to the left in the same angle, those of the same side parallel with each other. Here, too, no relation is noticeable between the parts of the wing over which the lines pass. The venation of the wing is utterly ignored by the leaf-markings, and its surface is treated as a *tabula rasa*, upon which anything conceivable can be drawn. In other words, we are presented here with a *bilaterally symmetrical* figure, engraved on a surface which is essentially radially symmetrical in its divisions."

Weismann says that he lays unusual stress upon this point, because it shows that we are dealing here "with one of those cases which cannot be explained by mechanical, that is, by natural means, unless natural selection actually exists, and is actually competent to create new properties; for the Lamarckian principle is excluded here *ab initio*, seeing that we are dealing with a formation which is only passive in its effects. The leaf-markings are effectual, simply by their existence, and not by any function which they perform. They are present in flight as well as at rest, during the absence of a danger, as well as during the approach of an enemy."

It appears to us, after careful consideration, that this passage is considerably overdrawn. Are the leaf-markings simply "effectual by their existence, and not by any function which they perform?" Does this quite state the case? Is not their very mode of development for a particular purpose a suggestion of function, and do they not perform the very necessary function of making the butterfly resemble a leaf? True it is that their function necessitates their remaining passive to be of service to them, and that movement would destroy the functional value of the specially-developed scales which form the leaf-markings. Neither do we, except in a limited sense, accept the view that natural selection has created new properties. It has distinctly produced a new pattern, but only by the modification of a previous one.

Weismann further says that we "are not helped here by the assumption of purely internal forces which Nägeli, Askenasy, and others have put forward as supplying a mechanical force of evolution. "It is," he says, "impossible to regard the coincidence of an Indian butterfly with the leaf of a tree now growing in an Indian forest as fortuitous, as a *lusus naturae*;" but, although we arrive at the same conclusion as Weismann, that selection has been the directive force which has produced the markings, we do so on other grounds than those by means of which he reaches this result. It may, as he says, be necessary to assume "pre-established harmony between the evolution of the ancestral line of the tree with its pre-figurative leaf, and that of the butterfly with its imitating wing," if we are to assume the directive force from within; but does not the true explanation really amount to this, that internal forces originate all these possibilities; whilst selection directs them into their several channels? Thus far, *i.e.*, considering selection as a directive agent, we agree with Weismann, that "cases exist wherein all natural explanations than that of selection fail us," but considered as a creative agent (any further than is assumed in its power to modify by direction) we doubt whether Weismann's illustrations prove anything.

Notes on the deviations in the Life-Histories of *Bombyx quercus* and *B. callunæ*.

By CAPT. B. BLAYDES THOMPSON.

(Continued from p. 128).

We may now consider the synonymy of the species. To give some idea of the entanglement in this respect of the species *B. quercus* and its variety, a correspondent of *The Entomologist* (vol. xii., p. 272) makes the following apposite inquiries:—"Newman describes and figures *quercus*, and simply mentions *callunæ* as a variety. Kirby calls Newman's *quercus*—*callunæ*, and makes no mention of *roboris*. Staudinger, in his 1861 *Catalogue*, gives one species, *quercus*, with *ab. roboris* and var. *callunæ*, the later (1871) *Catalogue* changing to var. *roboris* and *ab. callunæ*. Doubleday, in his *Catalogue*, 2nd (and last) ed., 1866, makes *roboris* a var. of *B. quercus*, and *B. callunæ* a separate species, and in his 1878 supplement he makes *callunæ* a synonym of *B. quercus*, and *B. roboris* a separate species, with *B. quercus* as a synonym. Mr. South, in his *List*, gives only one species, *viz.*, *B. quercus*, with *callunæ* and *roboris* as varieties." Then the correspondent inquires, "Is the species figured by Newman, *quercus*, *callunæ* or *roboris*? If it is *quercus*, what are the distinctions between it and *callunæ* and *roboris*, and are the two latter natives of Britain?"

These queries were put to the editor of *The Entomologist*, Mr. South, by a lady, and he replied:—"As regards *callunæ*, Palmer, and *roboris*, Schrank, the two varieties found in Great Britain, authors do not seem quite in accord. I apprehend that *quercus*, *L.S.N.*, x., 498, is the type form most generally distributed in Europe, including England, *callunæ* the form which occurs in moorland and mountainous districts, and differs from the type, principally in the darker colour of the female; and *roboris*, a variety of the male, which has the fulvous bars of the fore-wings wider than usual, and

broad fulvous margins to the hind-wings. *The opinions of others would be exceedingly interesting.*" The only opinion I could find (*l.c.*, vol. xx., p. 109) was curiously enough from another lady, Mrs. Battersby, of Westmeath, as follows:—"Many years ago I wrote to my old and valued friend, the late Hy. Doubleday, to ask him to explain to me the difference between *B. quercus* and *B. callunæ*. In reply he sent me a typical pair of *B. quercus*, desiring me to observe that in northern specimens (*callunæ*) the white spots on the upper side of the male are seen on the under as well as the upper surface; also that the bands differ. In *quercus*, on the upper-wings, the band turns inwards, and forms on the under-wings nearly a semicircle. In *callunæ*, on the lower margin of the upper-wings, the band turns outwards, and on the under-wings turns downwards to the anal angle. Mr. Doubleday mentioned that the form figured as *quercus* in *Newman's Moths*, was the typical form of '*callunæ*.' He believed *quercus* and *callunæ* to be distinct species. I have reared a good many *callunæ*, which were found invariably feeding on heather, in springtime. They grew to a large size before they formed cocoons, and usually emerged in the following year, and I have known them remain two years in the cocoons. Some of the males have a brilliant orange spot upon each upper wing, near the thorax."

It is plain, therefore, that the synonymy of *B. quercus* var. *callunæ* is in a very tangled state. I find in the *Linnaean Systema Naturæ* (Gmelin) the description of *quercus* as follows:—"Wings dark brown (ferruginous), with a yellow band; upper pair with a central white dot. Male dark brown, female ferruginous, the white dot furnished with a black ring."

Ochsenheimer, in his *Sehmet. von Europa*, says, "Male, dark chestnut-brown; female, reddish-yellow," and Treitschke's description is similar, while Haworth in his *Lep. Brit.*, describes *quercus* as "fore-wings brown, hind margin grey (!) with a yellowish central band and central white spot; female, paler." None of these authors allude to *roboris*, or any other variety.

When we come to Stephens, he describes the male *B. quercus* as "wings deep chesnut-brown with a broad yellow band; fore-wings with a central white spot, usually triangular, and a conspicuous yellow basal blotch"; female "generally of a luteous colour."

There cannot be any doubt about this being the variety *callunæ* and then he goes on to describe *roboris* as a separate species, as follows:—"Roboris—Similar to the last, but paler, fore-wings without yellow patch at base, white spot generally rounded, yellow band straighter and more dilated, female stouter, with broader and rounder wings." A very fair description of the type!

I have been favoured by Mr. C. G. Barrett with a perusal of the proof-sheets containing the descriptions of the imago and larva of *B. quercus*, for the large work he is now publishing. I find that he distinguishes the type from the variety by classing the latter as the "*Northern race*," and the former as the "*Southern race*," making one description suffice for both imagines, but according separate descriptions for their respective larvæ; and among notes of occurrences of larvæ he gives one of "a larva found as far north as Dumfries, feeding in May, has been known to produce a moth in August of the same year," but he omits to state whether the moth was the type or

the variety. If it was the type, it acted like its congeners, but if it emerged as the variety it would to some extent uphold Mr. Barrett's theory. Again, with regard to "larvæ found in Hampshire and the Isle of Wight, which fed up slowly and remained in pupa all winter," which form was it that emerged from these pupæ? *Callunæ* certainly occurs in the New Forest and in Devonshire, and unless these pupæ produced the type after remaining in pupa all winter, *cui bono*? When the climatic theorists can show that an imago of the unmistakable Southern form has been produced that had hybernated once as a larva and once as a pupa, they would have some foundation to build their theory upon, and they should also give some line of demarcation for the two forms, showing where the climate begins to take effect in the coloration, such as the Trent, the Tees or the Tyne, north of which the type is not found. There is no doubt that it occurs in Yorkshire; and Mr. Porritt, in his "Yorkshire list" says:—"The specimens found in the West Riding, and probably inland specimens generally, are the form *callunæ*, Palmer, but I believe the coast specimens are the true *quercus*." The larva occurs on the east coast of Yorks, being found on the herbage on the sea front, and it also occurs on the Lincolnshire, Norfolk and Essex coasts.

If we admit that these two forms constitute but one species, we are still confronted with the problem that two races exist, emerging at different periods, and presenting a marked difference in very many respects in every stage of their transformation. Occupying as they do in one case one year, and in the other two years to complete the latter, it is impossible to suggest that one is the offspring of the other, for it is certain that the offspring of each race emerges in the same month as its parents, the type in summer and the variety in spring.

This leads me to allude to the controversy which crops up from time to time in our periodicals, between our leading scientists, upon the question of *Tephrosia bistortata* (*crepuscularia*) and *T. crepuscularia* (*biundularia*). Are they separate species, or is one a variety of the other? The two points in dispute are, first, the ground colour, and, secondly, the time of appearance, much the same as in the species under our consideration at present. *T. crepuscularia* is said to be brownish, and *T. biundularia* whitish, and *T. crepuscularia* appears from February to April, and *T. biundularia* in May and June; and yet, notwithstanding the arguments *pro* and *con* that have appeared from time to time, we do not appear to be any nearer a solution of the enigma: Are they distinct species, or merely a type and its variety? The supporters of the theory, that because *T. crepuscularia* appears in April, and *T. biundularia* in May, urge that it is not possible for one to be a variety of the other, there not being time enough to permit of a brood maturing, and the objection appears a sound one. I am, however, surprised that the supporters of the theory that *T. biundularia* is a variety of *T. crepuscularia* have not quoted *B. callunæ* as a variety of a species appearing at one time of the year, and the type at another. We may, therefore, safely infer that the peculiarity attributed to *B. callunæ* is unique in the science of entomology.

I have now laid before you, I fear in a very imperfect manner, the leading differences in the life-history of *Bombyx quercus* and its variety, and it is manifest that we have yet much to learn respecting the

insects. We ought to know from the propagators of the climatic theory what they consider the Northern limit of the type or Southern race, or the altitude above which it does not occur; and we also require an undoubted example of that race, in the shape of an imago that has hybernated one winter as a larva, and another winter as a pupa. If the type occurs in Scotland as it does in Lancashire and Yorkshire, and carries out its metamorphoses in 12 months there, as in the South of England, the climatic theory is shaken to its foundation.

The pupa of *Cænonympha pamphilus*, with notes on its colour-changes just previous to the emergence of the imago.

By J. W. TUTT, F.E.S.

A pupa of *C. pamphilus*, received by me from Mr. S. G. C. Russell, on June 5th, from a larva which had hybernated the previous winter (egg laid in June, 1895), had been then in that stage about a fortnight. It was of a delicate pea-green colour dorsally, slightly glaucous on the sides of the well-developed meso-thoracic ridge. The skin is covered with tiny pale green rugosities, most abundant on the meso-thorax. The anterior edge of the face is bounded by a convex whitish ridge, and the two abbreviated nose-horns. The bases of the antennæ are dorsal. The lunular glazed eye is on the outside of the base of the nose-horns. The pupa is slightly depressed on either side where the antenna passes from the dorsal to the ventral area. A sharp, raised white ridge runs along the inner margin of the wing. The pupal neurulation is distinctly marked by slightly depressed furrows. These end with "Poulton's line," which is at some distance from the edge of the wing. The pro-thoracic spiracle is dorsal, placed on the marginal edge of the pro- and meso-thoracic segments, and is very inconspicuous, being of the same hue as the ground-colour. The meso-thorax is ridged medio-dorsally; the extreme apical margin of the ridge is grooved longitudinally, and the groove is continued as a darker green line, over the pro-thorax to the head. The 1st abdominal segment is small, and there is a movable joint between the 4th and 5th abdominal segments. Two inconspicuous pale yellow tubercular dots are placed one on each side of the slightly darker green medio-dorsal line, towards the back of each segment. Ventrally, there is a depression under each nose-horn. The first pair of legs short, the second pair long, extending to the knob of the antennæ. The latter extend to the tips of the wings, the tongue beyond them overlapping the upper part of the 5th abdominal segment. The cremaster is strongly built, with a stout lateral ridge, plentifully supplied with hooks, so that it suspends itself freely from an anal silken pad without the larval skin being attached.

On June 8th (9 a.m.), the dorsal waist formed by the depression of the meta-thorax and 1st abdominal segment had become dark green in colour, the meso-thoracic ridge was paler, and the abdomen bright green. The wings were brown, with a slight tendency to purplish, the fore-wings extending beyond Poulton's line to the margin of the wing. There were also distinct traces of the hind-wing along the inner margin and at the anal angle. The maxillæ and legs dark green. The antennæ paler, somewhat yellowish.

On June 9th (9 a.m.), the wing-covers, thorax, etc., showed

distinctly all the imaginal structures beneath; the imaginal wings distinctly visible through pupal wings, the full colour and markings being very distinct. The imago emerged about 11 a.m.

The newly emerged imago has a similar habit to that I have previously described as occurring in *Melitaea aurinia*, and other species, viz., that when the wings have attained their full size, but have not become stiffened, they are held so as to form a convex curve outwards, the inner margins of the wings being near, whilst the central portions of the wings are at some distance from, each other.

Varieties of *Melanippe fluctuata*.

By LOUIS B. PROUT, F.E.S.

(Continued from p. 155).

I now append a tabulation of the principal distinguishable aberrations, with such brief comments as seem desirable.

1. FLUCTUATA, Linn., *S.N. ed. x.*, p. 527; *et auct.*—Type form, with central fascia broad, on costal half of wing only.

SUB-FORMS:—*a.* Cinerascent, the ground-colour not conspicuously spotted; the c.f. abruptly terminated in centre of wing = *fluctuata*, L. (1758) = *cinerata*, Fourcr., *Ent. Paris.*, p. 274 (1785). This form does not appear to be very frequent.

b. Darker dusted, c.f. continued by dark rings, or slight dusky shading, to inner margin = Var. I., Snellen, *Vlinders*, i., 668. = ab. *fibulata* (? Hfn., *Berl. Mag.*, iv., 604).—As far as it goes, Hufnagel's description of his *fibulata*, which Rottemburg determines as *fluctuata*, L., agrees with this very common form of the species; in any case, I am not aware that it has otherwise been separately named, and it may, therefore, pass as "*fibulata*, n. ab.," if my citation of Hfn. appear precarious. The form is figured by Schwarz (Pl. xxiii., fig. 3 [5 by error] and 4), Duponchel (Pl. 189, fig. 3), Lyonet (Pl. xxvii., fig. 21), and others, presumably including Albin's wretched figure (Pl. xcix., g). Guenée's "type" figure (Goodart, *Metamorphosis*, iii, Pl. K) comes between abs. *a* and *b* of my classification, the band being broken off in the centre, as in the Linnean type, but resumed again in a spot on the inner margin—a phase of variation very frequent in some allied species, such as *Melanthia bicolorata*.

c. Ground colour ochraceous, markings as in ab. *b* = ab. *ochreata*, n. ab.—Here I would refer Hb. 249, though his figure is more brownish than the genuine ochraceous examples, of which there is one in the Zeller collection (labelled "Europe"), a record from Perthshire by Mr. T. W. Hall (*Proc. S. Lond. Ent. Soc.*, 1894, p. 65), and of which I have one bred example from my garden at Dalston. Wood's fig. 559 is also inclining towards this form.

Note.—The occasional almost pure white specimens, if otherwise typical, need not be separated from the very pale type of Linnæus. In some localities, e.g., Cannes (according to Milli re), very white forms predominate.

2. AB. INCANATA, Reuter, *Acta Soc. F.F.F.*, ix, No. 6, p. 72 (1893). Central fascia extended across the wing. This general name may, as I have already stated, be used as the equivalent of Guenée's var. *A*, for all normal specimens of this description; it includes the vars. *β* and

γ of Haworth, but the very distinct ab. *putridaria*, H.-S., should be separated, even though that has also a complete central band. It is curious that there seems no older available name than the *incanata* of Reuter. If Fourcroy's *alabastrina* (*Ent. Paris.*, p. 284 [1785]) were, as assumed by some of the older authors, really this species, it would no doubt represent the form in question; but it seems much more likely to belong to one of the *sociata* group. From circumstantial evidence, it is a moral certainty that Stephens' MSS. name *integrata* (*Br. Mus. Cat.*, p. 167 [1856]) belonged to the form, but no description was given, and it therefore sinks. As Mr. Tutt's new book (*British Moths*, 1896) will certainly fall into other hands than those of the beginners, for whom it is primarily intended, it is worth while to add *fasciata*, Tutt (*l.c.*, p. 275), as a synonym. These banded forms probably turn up occasionally, wherever the species occurs.

SUB-FORMS :—*d.* "Obscurior, al. ant. canescentibus" = ab. *incanata*, Reuter, ? = var. β of Haworth.

e. "Fascia media completa, sed insolida, sive cinerea" = var. γ of Haworth = ab. *insolida*, mihi.—Mr. R. Adkin has kindly shown me an aberration in his collection (from Lewisham), which I assume to be this form of Haworth's.

Note.—If *white* forms with a complete fascia exist, otherwise than in the forms belonging to ab. *putridaria*, or var. *acutangulata*, yet another name will be required here, as both the foregoing have the ground-colour somewhat darkened. A banded figure of Herrich-Schaeffer's (fig. 335, *corollaria*), which Staudinger thinks may be an aberration of *fluctuata*, has not yet been definitely determined: it is generally referred to *unicata*, Gn.

3. AB. PUTRIDARIA, H.-S., 535 (*nec.* 536); *acutangulata* ♀ (*Rom., Mem. sur Lep.*, iii., p. 2).—Ground-colour white or pale, basal patch only darkened at its outer edge, central fascia with a patch of the pale ground-colour in the middle of its costal portion. I know of no sub-forms, and, therefore, indicate this as *f*—ab. *putridaria*, H.-S., 535 (1847).

4. AB. NEAPOLISATA, Mill., *Ann. Soc. Ent. Fr.* (6), vii., p. 218, Pl. v., fig. 7 (1887); ? *Icon.*, iii., p. 267 (1872).—Ground-colour strongly darkened.

SUB-FORMS :—*g.* Tolerably uniform dark grey or brown-grey = ab. *neapolisata*, Mill. ? = var. δ, Haw. = var. B, Gn.

h. The darkening produced by numerous tolerably distinct dark waved lines on the paler ground = ab. *undulata*, n. ab. = var. II., Snellen.

i. Very dark, almost black = ab. (? var.) *thules*, n. ab.—This is the extreme Shetland form, as described and figured in *Entom.*, xiii., 291, Pl. iv., fig. 6.

Note.—Examples combining the characteristics of the aberrations *incanata* and *neapolisata* (*e.g.*, Dup., 189.4), had best be described simply by compounding the names. I am already in danger of being accused of over-elaborating the varietal nomenclature.

5. AB. COSTOVATA, Haw., *Lep. Br.*, ii., p. 334 (1810).—Central fascia reduced in width. This is equivalent to Guenée's var. C.

SUB-FORMS :—*j.* "Abbreviated central fascia, small and sub-oval" = ab. *costovata*, Stph., *Ill. Haust.*, iii., 220 (1829); Haw., *Lep. Br.*, *pro parte* = H.-S., 294.

k. (? *præc. eadem*). "Wings more pointed, strong silky gloss, only

a short transverse stripe from the costa, instead of the black-brown costal half of the central area" = ab. *rimata*, Nowicki, *Verh. z.-b. Gesellschaft in Wien*, xv., p. 182 (1865).

l. "Smaller, almost clear white, with reduced black costal spot" = ab. *sempionaria* (Rätzer) Frey, *Lep. der Schweiz*, p. 229 (1880). Mountains, Simplon and Gadmenthal. This name may perhaps be retained to distinguish the white forms of *costorata*, the older name designating the cinereous specimens.

m. "Markings reduced almost to vanishing point," only a very small spot on the costa remaining = ab. *deleta*, Ckll., *Entom.*, xxii., 100 (1889).—This is, of course, merely an extreme development of the ab. *costorata*, but I would point out that when the costal spot is reduced absolutely to a minimum, it is generally rather triangular than sub-oval in form; and as I believe Mr. South's specimen, which furnishes the type of this name (*Proc. S. Lond. Ent. Soc.*, 1886, p. 44), belonged to this form, it will be quite legitimate thus to restrict the name *deleta*, merely, however, as a very slight sub-variety of ab. *costorata*. H.-S. 292, has the blotch triangular, though not extremely reduced.

n. Central fascia wanting = ab. *immaculata*, Tutt, *Ent. Rec.*, i., 322 (1891).—I have already detailed the few specimens of this extreme form known to me. Specimens with a non-costal remnant of the dark colour round the central spot are perhaps also better referred here than anywhere else; one such may be seen in the Doubleday collection.

Note.—Examples combining the characteristics of the aberrations *costorata* and *incanata*, had best be described simply by compounding the names.

One last phase of aberration, exemplified in two or three specimens in the Zeller collection, does not fall under any of the above heads. This I denote—

o. Ab. *confusa*, n. ab.—The outer area of forewings, especially on costal half, longitudinally smeared with the dark colour, presenting the appearance of having had water poured on the central fascia, which had caused the colour to "run." The aberration is very hard to describe, but has a very characteristic aspect.

Notes on the Life-History of *Enodia hyperanthus*.

By J. W. TUTT, F.E.S.

I. THE FULL-GROWN LARVA OF *ENOEDIA HYPERANTHUS*.—GENERAL DESCRIPTION.—The head is large, dull orange or brownish in colour, the neck constricted, the skin thickly warted and hairy; the colour greyish with a tinge of green, the latter tint more marked on the thoracic segments. A dark subcutaneous medio-dorsal line, not conspicuous on the thorax, more strongly marked on the last sub-segment of each abdominal segment, and becoming continuously dark from the 6th abdominal to the anal segment, ending posteriorly between the two bristly anal points, which are well separated. A pale tumid flange separates the lateral and ventral areas, the flange being marked with hairy serrations, which mark the segmental and sub-segmental incisions, the latter somewhat obscurely. Midway between the medio-dorsal line and lateral flange is a pale subcutaneous, sub-dorsal line, whilst between this and the lateral flange are the

minute but distinct black spiracles, those on the 1st thoracic segment and ninth abdominal segment being the most conspicuous.

SUB-SEGMENTS.—The sub-segments are somewhat obscurely marked, but the segments appear to be subdivided as follows: *Pro-thorax*—2 sub-segments. *Meso-thorax* and *Meta-thorax*—4 sub-segments, those of the meso-thorax very distinctly marked. *Abdominal*—4 or 5 sub-segments. There are 4 clear sub-segmental divisions, of which the two anterior are very closely united, and only really distinguishable when the larva is crawling. The hindmost sub-segment also shows traces of duplication.

HEAD.—The head is of a dull orange-brown tint, with a few minute black dots towards the crown. It is large, divided longitudinally by a median depression, which bifurcates above the mouth. The skin of the face is warty, the warts bearing short brown bristles, the ocelli placed low down, blackish, five, forming a lunule, pointed outwards, and one beyond the lunule. The mouth parts are blackish-brown.

THORAX.—The thorax is pale greenish-grey in colour, dorsally covered with pale scabrous-looking warts, arranged transversely, each giving rise to a dark brown bristle. The pro-thorax narrow, divided into 2 sub-segments, with a distinct black spiracle placed on the lateral flange, just above the first pair of legs. The meso-thorax and meta-thorax with 4 sub-segments somewhat distinctly marked. The ventral area paler greenish-grey, covered with numerous warts, and pale hairs; the legs greenish-brown, with pale brown terminal hooks.

ABDOMEN.—*Dorsally.*—The abdominal segments are whiter, and with rather less of the green tinge that is noticeable in the thorax. The first sub-segment on each segment is wider than the succeeding ones, and also whiter, the third, fourth and fifth (so far as it is distinct) sub-segments being greener, especially when the larva is crawling. The skin itself is thickly covered with pale scabrous warts, each bearing a longish brown bristle. The warts and bristles are arranged transversely, and mark the sub-segments, the segmental incisions not at all deeply cut, except laterally. A black spiracle is placed on the common lateral portion of the 1st and 2nd sub-segments of each abdominal segment (these sub-segments being, as before stated, only indistinctly separable on the dorsum), and placed just above the pale tumid lateral flange. *Ventrally*, between the lateral flange and the prolegs, the skin is marked with reddish dots and patches, whilst the ventral area of the caterpillar is pale greenish-grey, and is thickly covered with pale warts, each bearing a black hair. The prolegs are of the same tint, also warty, and bear similar hairs; the terminal hooks on the prolegs are brown.

II.—**THE QUIESCENT STAGE PRECEDING PUPATION OF THE LARVA OF ENODIA HYPERANTHUS.**—I have, fortunately, been able to make some observations on the way in which *Enodia hyperanthus* prepares for pupation. It first of all moves round and round among the grass, until a hollow cavity is formed. It then spins together, with a few strands of pure white silk, the grass leaves above it, so as to enclose itself, as it were. Then it clasps a single leaf of grass, its anal segment resting on the ground, and clings thus, in a vertical position, almost as if it were suspended by a girth, after the fashion of a Pierid, to the grass culm; but it is not fastened in any way.

In the course of a day or two the larva becomes shorter, the head is drawn down, the dorsal area much humped centrally, the anal segment still, however, resting on the ground. The greenish hue present in the active caterpillar entirely disappears. The colour is very pale, whitish-grey, and almost unicolorous, except for the dark medio-dorsal line, which retains its chief characteristics. The segmental incisions are more distinct than in the active larva. The transverse, sub-segmental arrangement of the warts and their hairs is more evident, and the larva loses, more or less, its hold on the grass culm, but still maintains its vertical position, by virtue of the anal segment resting on the ground. In this quiescent state it remains about seven days, when it turns to a short blunt pupa, without attachment. The structure of the cremaster, which terminates in two blunt blackish points, is such, that it may be taken for granted that there is no possibility of this species suspending itself.

III.—THE NEWLY-FORMED PUPA OF *ENODIA HYPERANTHUS*.—On the morning of June 12th, I was fortunate in finding a pupa of *Enodia hyperanthus*, which had evidently only pupated, at the most, a few hours. The larva had been in the quiescent stage a whole week. The marvellous transparency of the external organs, led me to make a note upon the newly-formed pupa.

The *ventral area* is quite transparent—wings, antennæ, legs and maxillæ. Through them, the usually hidden ventral parts of the thoracic, and the 1st, 2nd and 3rd abdominal, segments are distinctly visible, as gristly-looking continuations of the dorsal rings of the same segments. At this stage these transparent areas are quite spotless, except for the darker glazed eye, and a brownish discal mark towards the base of the wing. Poulton's line is faintly traceable as a sort of ill-defined depression just within the apex of the wing. The abdominal segments ventrally are not transparent, but of the palest wainscot tint.

The *dorsal area* is opaque, of the palest possible wainscot tint, with a pinky hue about the thoracic segments. The meso-thoracic ridge (which is ill developed as such) is marked with a sub-cutaneous, fine, pinkish line (evidently part of the medio-dorsal stripe), and has on either side a minute black tubercular dot. Otherwise the well-developed, and comparatively large brown rims of the pro-thoracic spiracles are the only darker markings visible on the thorax. The waist (meta-thorax and 1st abdominal segment) tends to be slightly transparent, thus approaching, but not becoming so in the same degree, the transparency of the ventral area. The abdominal segments are of the palest wainscot, with faint brownish incisions, the brown cremaster bent backwards ventrally. A trace of the medio-dorsal line (evidently a continuation of that on the meso-thorax) commences on the 6th abdominal, and runs backwards to the anal segment.

Laterally, the spiracles on the abdominal segments 2-8 are rather distinct, appearing as black specks (to the naked eye), but being well-defined structurally under a lens of moderate power. A few black dots are also visible at the base of the ridge, along the inner margin of the wing.

IV.—VARIATION IN THE MARKINGS OF THE PUPA OF *ENODIA HYPERANTHUS*, WITH SOME NOTES ON THE COLOUR CHANGES PRECEDING EMERGENCE.—It is generally assumed that the pale wainscot-tinted pupa of *E. hyperanthus* has certain characteristic dark longitudinal streaks

crossing the wing, and that these are somewhat constant in position and conspicuousness. A specimen, however, which I received from Mr. Wolfe (Skibbereen, co. Cork), towards the end of May last, was of a delicate pale pinky-brown hue, with no dark markings or streaks whatever. Another example, received from Mr. S. G. C. Russell, on June 5th, was pale brownish, with a distinct ruddy tint, the wings almost transparent, with reddish-brown neurational lines on the outer half, and a dark red-brown discal streak, the area between Poulton's line and the outer margin pale, whilst the glazed eye, situated at the ventral edge of the abbreviated nose-horns, was also dark brown, and very distinctly marked. I observed, too, what is not always so distinct, a double series of tiny black dots on either side of the sub-median line of the abdominal segments ventrally. I have no doubt that the pupæ would be found to vary considerably in tint and markings if a sufficient number were examined.

The change in coloration as the pupa approaches emergence is slow, but continuous. On the 2nd of June, the pupa mentioned above as sent by Mr. Wolfe, became darker brown; it was much darker on June 3rd, and by June 4th the wings were black, and the fore-wings pushed out beyond Poulton's line to the outer margin of the wing. On June 5th, at 9 a.m., the imaginal organs were all pretty distinct, the antennæ being quite ruddy in tint. The imago emerged about 11 a.m. of the same day. (The earliest example I have ever had).

On June 18th, the pupa sent by Mr. Russell (and which had pupated on June 4th), was not noticeably darker, but, on June 19th, at 9 a.m., the wing-covers were getting quite black up to, but not beyond Poulton's line, the outer margin of fore-wing and edge of hind-wing brownish. The head and thorax black, with the prothoracic spiracle shiny black and prominent. A broad medio-dorsal black band runs down the abdomen, broadening on the 3rd, 4th, 5th and 6th abdominal segments; the lateral and ventral areas of the abdomen dark, dirty greyish-brown, the glazed eye very distinct and brownish. The butterfly emerged on June 21st.

SCIENTIFIC NOTES AND OBSERVATIONS.

WING EXPANSION OF *ACHRÆA GRISELLA*.—Dr. Chapman sent me a large quantity of pupæ of this species in honeycomb on June 13th. I had bred the species before, but was much interested in observing the rapidity with which the wings of this species expand. The wings appear to grow whilst the newly emerged insect runs about mouse-like. A minute's rest to expand the apical portions of the wings is sufficient to complete the work, when, if disturbed, it adopts its mouse-like habits without more ado.—J. W. TUTT.

ON THE COLORATION OF THE COCOONS OF *BOMBYX QUERCUS*.—With regard to Captain Thompson's quotation as to the colour of the cocoon of *Bombyx quercus* (*ante*, p. 126), I may say that I have taken and bred scores, and have never seen a "yellow" one yet. I may also add, in reference to Captain Thompson's remarks on the hibernation of the type form, that at Derby, on February 14th, 1865, I took 29 cocoons of *B. quercus* from the bottom of a hawthorn hedge. These were large brown oval-shaped cocoons, from which the ordinary type was

bred. The cocoons were obtained by sifting the dead leaves, accumulated in the forked branches, through my fingers. There was no heather anywhere within miles of this locality. There is no doubt that the larvæ had fed on *Crataegus oxyacanthus*.—H. TUNALEY, F.E.S., 30, Fairmount Road, Brixton Hill, S.W.

TEPHROSIA BISTORTATA (CREPUSCULARIA) AND T. CREPUSCULARIA (BIUNDULARIA).—I have taken *Tephrosia crepuscularia* (*biundularia*) here about the second week in April, but only sparingly. At Port Talbot the year before last it was out in the woods in plenty during the first week of May. *T. bistortata* (*crepuscularia*) appears here in the first or second week of March. I think that these are decidedly distinct species, although, in general appearance, one seems sometimes to run into the other so closely, that it is somewhat difficult to tell the one species from the other. I get both species nearly black, but *T. bistortata* always has a browner tint, *T. crepuscularia* (*biundularia*) being in its extreme forms pure black with a white line near the margin.—(Major) R. B. ROBERTSON, Royal Arsenal, Swansea. August, 1896.

PROTECTION OF LARVA OF ZEPHYRUS BETULÆ.—I never saw the larva of *Z. betulæ* move in day-time in nature. They always sit on the underside of a leaf along the mid-rib, and are most difficult to see. It is, I believe, a matter of common observation, that they are protected when young by their resemblance to a *Syrphus*. The laws of "mimicry," as established by Bates and others, are well exemplified. Thus the larvæ are doubly protected.—H. J. TURNER, F.E.S., 13, Drakefell Road, St. Catherine's Park, S.E. August, 1896.

HYBERNATION OF PARARGE EGERIA.—I have been greatly interested in your paper in the *Ent. Record* of 1st July, on the hybernating stages of British butterflies, a subject on which full and trustworthy knowledge has long been wanting. So far as my own experience goes—unfortunately it only extends to between twenty and thirty species, and not by any means to every stage in all of these—it confirms your conclusions, except in the case of *P. egeria*, which, I incline to think, sometimes hybernates as a pupa in England. In the latter part of August, 1892, I obtained in the New Forest a large number of eggs of this species. They were fed on grass, in a cool room, and pupated between the 28th October and the 27th November. As they pupated they were placed in a balconette, exposed to the north-west. About twenty pupated, and of these five survived. Three, which were forced in the middle of February, emerged in from seven to eight days, the other two emerged on the 10th and 14th April respectively. Of course this is not conclusive, as the larvæ were probably 5 to 10 degrees warmer than they would have been out of doors, and therefore pupated earlier; but the facts that the pupa will bear the winter temperature, and that the perfect insect appears in the spring earlier than any of the other English species which are stated to pass the winter as larvæ, leads me to believe that a considerable number of individuals, in some winters, at all events, hybernate as pupæ. If Mr. Greene could state in what month he found his pupæ, that would probably settle the question.—F. MERRIFIELD, F.E.S., 24, Vernon Terrace, Brighton.

Mr. Merrifield's note seems pretty conclusive that *P. egeria* might possibly hybernate in Britain in the pupa state. It recalls to my

mind also a note by Mr. J. H. Carpenter, written on Feb. 13th last, but not published (*Science Gossip*, iii., p. 13) until my own note (*Ent. Record*, viii., p. 101) was in print. Mr. Carpenter writes:—"I have had under observation, during the winter, a brood of *Pararge egeria*, which I raised from ova deposited at the end of August, 1895. Some of the various members of this brood have behaved unusually during hybernation. The larger part fed up rapidly in autumn and turned to pupæ, the remainder being still in the larval condition. It is usual, I believe, for this species to hibernate as a caterpillar. I placed half the pupæ of this brood out of doors, and the rest were kept in the dining-room, where there is a fire daily during winter. No change was observed until the first week in February, when some of the chrysalides began to turn dark-coloured, and the first perfect example emerged on February 7th. About the same time, the larvæ, which had remained passive, commenced to feed and are rapidly progressing towards maturity." This led me to write to Mr. Carpenter, and in reply to some queries I put to him, he said:—"With reference to *P. egeria*, I may say, that for some little time past I have been at a loss to understand its habits. The non-hibernators (*i.e.*, those that did not hibernate as larvæ), as you suggest, pupated in November, the portion of the pupæ that I left out of doors emerged in March and April, and all emerged with but one or two exceptions. The other portion of these pupæ, which were kept indoors all the winter, emerged towards the end of February, but nearly all were cripples. This may have been through an unfortunate mishap to the box they were in, during the moving from Streatham to Sutton. The pupæ got very considerably shaken and no doubt injured. The wings seemed to be properly formed, but the insects were quite incapable of holding on to anything, and so the wings did not properly develop. The larvæ that hibernated pupated as usual, and emerged a little later than the pupæ that were kept out of doors. As I still have this species under notice, it will be well to see what results are obtained from another winter; but, at the same time, I feel certain that the species will pass through the winter in either the larval or pupal stage." Of course, the winter of 1895-6 was most abnormal, and not at all colder than is the month of October in many years. Still there is here good *prima facie* evidence that we have a butterfly, whose normal habit is to hibernate as a larva, but which can, under certain conditions, do so as a pupa. If so, the fact is most interesting.—J. W. TUTT. August, 1896.

HYBERNATION OF *PYRAMEIS ATALANTA*.—I agree with you in the opinion (*ante*, p. 98) that *Pyrameis atalanta* cannot hibernate as a pupa in England; my reason being that I never found that the pupa could survive a long exposure to winter temperature.—F. MERRIFIELD, F.E.S., 24, Vernon Terrace, Brighton.

CURRENT NOTES.

We apologise most humbly for the annoyance and inconvenience to which our subscribers were put last month, owing to being charged excess postage on No. 6. Before starting for our holidays, the various parts which make up the Magazine were weighed on ordinary scales, and appeared to be within the weight allowed. Finding, on our

return, that the issue had been surcharged, we discovered that, on a delicate balance, the scale was just turned, and that it was on this that the excess was charged. We can only reiterate our apology.

Entomologists interested in the fauna of the Isle of Man, cannot do better than write to Mr. H. Shortridge Clarke for a copy of his Report read before the Isle of Man Natural History and Antiquarian Society, in June last.

Mr. Roebuck has just completed in *The Naturalist* (July and August) his "Bibliography of the Lepidoptera for the North of England, 1892."

As will be seen by reference to our advertisement columns, Mr. Stevens has received instructions to sell by auction the collection of Mr. C. A. Briggs. This is one of the very finest collections in the country, and is sure to attract a large number of buyers.

Mr. H. W. Marsden records the capture of *Lycaena arion* in Gloucestershire, by his son, in 1889, in 1895, and again this year. This year it was found on June 3rd, "some specimens worn," thus it must have been out before the end of May. He says that he failed to find the insect at Dursley, Stroud, and other localities, with the exception of "one specimen seen, one turned loose, and one pinned." He considers that its extinction is only a matter of time, although he states that he cannot pretend to say what "the prospect of the new locality," discovered by his son, may be.

PRactical HINTS.

Field Work for September.

1.—The larva of *Sericoris euphorbiana* is to be found in the closed heads of *Euphorbia amygdaloides* during the first fortnight of September.

2.—During September, larvæ of *Elachista taeniata* mine in *Brachypodium sylvaticum*.

3.—In September, the larvæ of *Eupithecia expallidata* are to be found on the flowers of golden-rod (*Solidago virgaurea*).

4.—The middle of September is the best time to beat the larvæ of *Eupithecia helceticata* from juniper.

5.—In September, collect the seedheads of *Bartsia odontites* for larvæ of *Emmelesia unifasciata*.

6.—In September, search out a locality where ragwort abounds. Beat the ragwort heads against the sides of an old umbrella. Several species of *Eupithecia* larvæ are thus to be obtained; among others, *E. satyrata*, *E. centaureata* and *E. absynthiata* are usually the most abundant.

7.—Seedheads of *Angelica sylvestris*, in September and October, must be collected for larvæ of *E. trisignata* and *E. albipunctata*. Flowers and leaves of *Achillea millefolium* in September, give larvæ of *E. subfulvata*.

8.—The larva of *Stigmonota weirana* is to be found feeding between beech leaves in September. It pupates in October.

9.—Beech nuts should be gathered in September and October for larvæ of *Carpocapsa nimbana*. This larva also pupates among moss on the trunks of beech trees.

10.—The larvæ of *Asthena blomeraria* are to be beaten during September from wych elm.

11.—During September the larva of *Erastria fasciana* (*fuscula*) is to be swept by night from *Molinia caerulea* (and perhaps other grasses). The larva pupates about the end of the month.

12.—Larvæ of *Boarmia roboraria* hibernate well in London on birch, and eat the bark of the twigs before the leaves appear. As they sometimes kill the young shoots, early removal in spring to another branch is necessary.

13.—Larvæ of *Pyrausta punicealis* are to be found during September feeding on the flower heads of *Nepeta cataria*, under a confused covering of silken threads. They spin tough cocoons about the middle of October, and pupate irregularly in the spring.

14.—During September search *Galium* (especially isolated plants growing on shingly beaches) for larvæ of *Macroglossa stellatarum* and *Deilephila galii*.

SOCIETIES.

THE CITY OF LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY. July 21st, 1896.—Mr. C. Nicholson, Secretary, in the chair.—Exhibits:—Mr. Sauzé: INSECTS FROM THE NEIGHBOURHOOD OF DEAL, consisting principally of TORTRICIDES, but including *Callimorpha dominula*, *Bryophila perla*, *Liparis salicis*, *Melanargia galatea*, and *Cupido minima*. Mr. Riches: Series of *Sesia myopaeformis* from his garden at Hornsey. Mr. Heasler: A specimen of the English *Cicada* (*Cicadetta moneta*) from the New Forest in June. He said he had seen this species in some numbers in the New Forest, and had his attention drawn to the insect by the whirring noise which it made. He was quite unable to say how this was produced, but it was certainly not with the legs. Mr. Cox: A black *Limenitis sibylla* from the New Forest. Mr. Cox gave a LIST OF HIS CAPTURES AT BROCKENHURST during the first week in July of this year. These numbered about 400 insects, including nine species of Footmen, amongst which were *Lithosia deplana*, *Gnophria quadra*, *L. griseola* and *Emydia cribrum*. Other insects taken included *Cymatophora fluctuosa*, *A. leporina*, *Tryphaena subsequa*, *Dyschorista suspecta*, *Arentia flevula*, *Noctua stigmatica*, *Cleora glabraria*, &c., &c. Several MELANIC SPECIMENS OF LIMENITIS SYBILLA were reported from the New Forest. Mr. Tremayne recorded *Iodis cernaria* from Westerham. He referred to the general DEARTH OF LEPIDOPTERA BY DAY just now, and suggested that the abnormal heat of the season might have caused an unusually large number of pupæ to dry up, as had been the case in his breeding cages, in spite of regular damping. Mr. Frost recorded the following SPECIES (*inter alia*) FROM OLD HALL, IPSWICH:—July 11th, at dusk: *Cyaniris argiolus*, *Hemithea strigata*, *Hyppena proboscidalis*, *Notodonta carmelita* (note date, Ed.): at sugar: *Caradrina alsines*, *Leucania comigera*, *Xylophasia scolopacina*, *Phaetrea rumicis*, *Leucania pallens*, *Gonophora detersa*; July 12th, by day: *Argynnis aglaia*, *A. adippe*, *Eugonia polychloros*, *Limenitis sibylla*, *Apatura iris*, *Hipparchia semele*, *Enodia hyperanthus*, *Chrysophanus phloas* (in good condition), *Cyaniris argiolus*, *Thymelicus thaumas*, *Hepialus sylvanus*; at dusk: *Selenia illunaria*, *Hemithea strigata*, *Timandra amatoria*, *Macaria notata*, *Lomaspilis marginata*, *Hypsipetes sordidata*, *Coremia*

unidentaria, *C. ferrugata*, *Scotosia undulata*; at sugar: *Lithosia complana*, *P. ruficis*, *Craniophora ligustri*, *Leucania conigera*, *L. lithargyria*, *L. pallens*, *Xylophasia lithorylea*, *X. scolopacina*, *Miana literosa*, *M. strigilis*, *Rusina tenebrosa*, *Tryphaena orbona*, *T. fimbria*, *Dyschorista suspecta*, *Cosmia affinis*, *Gonoptera libatrix*, *Naenia typica*, *Hyppena proboscidalis*.

August 4th, 1896.—Exhibits:—Mr. Oldham: fine forms of *Pieris rapae* and *P. napi*, taken last month in Cheshire. Mr. Bate: *Selenia tetralunaria*, exhibited as representing the conclusion of an experiment in heredity commenced by Mr. Bacot. The specimens were of the summer brood, and most of the larvæ had pupated after the fourth change, though a few had an additional cast. All these latter came out ♀s, and were larger than those which had only four changes. Mr. Dadd reported *Noctua dahlia*, and two specimens of *Tryphaena subsequa* from the New Forest, where he had found *Noctua stigmatica* very common. He also recorded *Cyaniris argiolus* from Wood Green, and *Drepana cultraria* at sugar. Mr. Tremayne reported Lepidoptera scarce, and sugar a total failure, at Tunbridge Wells. Mr. Oldham reported sugar and everything else unsuccessful in Cheshire. Mr. Nicholson reported Lepidoptera common at Conway.

SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—On July 9th, 1896, Mr. R. Adkin exhibited a short bred series of *DIANTILECIA CONSPERSA* FROM LARVÆ TAKEN IN HOY. They were all dark in colour, about midway between the Shetland and Scottish mainland forms. Also a series of *D. capsicola*, from the same locality, showing no variation from the usual English form. Mr. Auld, series of VARIETIES OF *ABRAXAS GROSSULARIATA*, bred this year. One specimen was of an unique form, the basal half of each wing being curiously streaked, while the outer half was quite normal. On the hind-wings the streaks were very irregular in length. Mr. Turner, series and LIFE-HISTORIES OF the following species of *COLEOPHORA*:—*C. lineola* from Brockley and Lewisham, *C. albitarsella* from Lewisham, *C. palliatella* from Epping Forest, *C. lariciella* and *C. fuscadinella* from Carlisle. The latter species showed the young curved cases, which are abandoned early and new straight ones made. Also living pupæ of *Gonopteryx rhamni* from Byfleet. Mr. Lucas, bred specimens and pupa skins of the local dragonfly, *Erythromma najas*, from Byfleet. Mr. Enock, a living specimen of the very rare MALE OF *PRESTWICHIA AQUATICA*, which, with the assistance of Messrs. Dennis and Scarfield, he had discovered in a pond in Epping Forest. It had only the merest rudiments of wings. He much doubted the statement that the species was parasitic on the eggs of dragonflies. The ovipositor seemed too strong and too long. He suggested that the ova were deposited in some aquatic larvæ. On July 23rd, 1896, Mr. West (Streatham) exhibited specimens of *Catocala promissa* and *C. sponsa*, bred from larvæ taken during the Society's Field-meeting at Whitsuntide. Mr. Robt. Adkin, a SERIES OF A *HYPsipETES* bred from larvæ taken in Orkney by Mr. McArthur. He was unable to say whether they were *H. trifasciata* or *H. ruberata*, although he was inclined to think they were referable to the latter species. He also exhibited a specimen of *Coenonympha pamphilus*, with the row of ocelli on the underside very well developed. Mr. Dennis, a SERIES OF UNDERSIDES OF *CUPIDO MINIMA*, taken at Horsley, shewing a complete

gradation in the number and development of the spots, and also one upper side well scaled with blue. Mr. Fremlin, specimens of *Polyommatus astrache* v. *salmacis*, from Castle Eden Dene. Mr. Mansbridge, VARIETIES OF *ABRAXAS GROSSULARIATA*, bred from larvæ obtained at Horsforth. Out of 150 larvæ, 2 or 3 % only shewed a more than ordinary variation, compared with some 15 % last year from the same locality. Two specimens were asymmetrical and one was a nicely radiate form. Mr. West (Greenwich) exhibited specimens of the Hemipteron, *Dicypthus epilobii*, from Eltham. Mr. Moore, a specimen of the second brood of *Cyaniris argioides*, taken on July 12th at Oxshott, and also a specimen of *Plebeius aegon* destitute of the row of fulvous blotches on the upper surface, and one having confluent spots on the under side. On Thursday, August 13th, Mr. S. Stevens exhibited an unusually small specimen of *Papilio machaon*, having the black band on the hind-wing very narrow. Mr. R. Adkin, a bred series of *Pachnobia hyperborea*, from pupæ taken at Rannock. Mr. McArthur, a preserved larva of the same species, mounted on a twig of its food-plant (*Empetrum nigrum*) the Crowberry, and gave interesting details as to its life-history. Mr. Fremlin, a series of *Phigalia pedaria* from Saltash, including the dark reticulated form, and the very dark uniform variety. Mr. H. Moore, numerous interesting INSECTS FROM SOUTH AFRICA, including a fine specimen of *Actias mimosae*, which, from its sluggish habits, can be easily picked off the bushes, its larvæ are more or less gregarious; several species of the larger Orthoptera, *Pachytylus pardalinus*, the species which often appears in vast numbers and does considerable damage; *P. peregrinus*, which is the Locust of N. Africa; *Cyrtacanthus purpurifer*, a very large species; *Acheta africana*, a mole cricket from Johannesburg; and numerous species of Coleoptera, which are attracted in thousands to the electric light in Pretoria. Mr. Sauzé, a SPECIMEN OF *CICADA ANGLICA* (*CICADETTA MONTANA*), one of three taken by Mr. Heasler in Surrey. Mr. Heasler had been attracted to some oak trees by an unusual stridulation, and eventually succeeded in obtaining these three examples. Thus a doubt as to whether this species stridulates or not has been cleared up, there being no previous record of such, in this country. Mr. West, of Greenwich, a series of the local Hemipteron, *Eurygaster maura*, from Folkestone. Mr. Mansbridge, a DOUBLE COCOON OF *CLISIOCAMPA NEUSTRIA*, from which, although the imagines had emerged from the pupa cases, they had been unable to extricate themselves. When cut open there was only one cavity partially divided into two. Mr. Barrett exhibited FOUR BRITISH SPECIMENS OF *PLUSIA NI*, two belonging to Mr. Jeffrey and two to Mr. Briggs. One of the former was captured in Surrey. Also a fine var. of *Cleoceris riminalis*, having the basal half of the fore-wings very dark in contrast to the very pale outer portion; and a remarkable form of *Agrotis exclamantis*, in which neither of the stigmata were developed, but the elbowed and basal lines were very distinct and perfect on the uniformly pale brown ground colour. [The form of *Cleoceris riminalis* here recorded as a variety, is the rare type form, see *Brit. Noct. and their Varieties*, Vol. iii., p. 51. Mr. Page bred two or three this year from Kent larvæ.—ED.]

NORTH LONDON NATURAL HISTORY SOCIETY.—July 23rd, 1896.—Exhibits: Mr. Harvey: *Geometra papilionaria* from Epping Forest larvæ. Mr. R. W. Robbins said he had been more or less commissioned

by the Society at the last meeting to find out the FOOD-PLANT OF *PAPILIO MACHAON* IN THE ALPS. Having spent a week at Lucerne, he had found the wild carrot extremely plentiful at elevations as high as those whereon *P. machaon* occurred, and had no doubt this was the food-plant. Mr. Prout wrote from SANDOWN: "July 22nd, . . . I consider the season decidedly better than the average . . . One wreck of *Agrotis lunigera* turned up at sugar on Monday night . . . Sugar has paid well, but only in the ordinary species; *Caradrina taraxaci* is commoner than usual, and some pretty forms have been taken. *Miana bicoloria*, *M. literosa*, &c., are in about their usual numbers, *Leucania conigera* perhaps a trifle commoner than usual. Last night, it was too windy for convenient work in the Culvers, and I therefore preferred to visit my *Calamia phragmitidis* ground, which is sheltered by the West Cliff. *C. phragmitidis* proved unfortunately to be worn (though last year I took it in good condition right into August), but the dusking was rendered rather exciting by the unwonted abundance of three large species, *Bombyx quercus* ♀s., both sexes of *Odonestis potatoria* and *Urapteryx sambucaria*. I think it must be a good season for the BOMBYCIDES; I picked up one species which I had not previously met with in the perfect state, a ♂ *Clisiocampa neustria* at rest on a grass stem. By day the most noteworthy thing has been the extreme abundance of the second brood of *Cyaniris argioides*, unapproached since I commenced visiting Sandown in 1887. Once I got three in my net at the same time, and more than once in striking at one which was just out of reach, I netted another which chanced to "cross the line of fire" at the moment. As in 1893 we shall doubtless be favoured with a liberal supply of second broods. Those of *Phibalapteryx ritualbata*, the *Coremias*, &c., are fully out and more than ordinarily common, while of less general second broods I have already noticed *Nisonioides tages*, *Zonosoma punctaria*, and a lovely *Melanippe unangulata* which can hardly be a retarded straggler from the May-June brood. I am somewhat doubtful where to class a good specimen of *A. marginepunctata*, as we are just midway between the time of the two broods. As an undoubted contra to the early dates I am recording, I may mention that on Monday afternoon I came upon a colony of *Zygaena trifolii*, a species which is generally over when I arrive here, in beautifully fresh condition. *Cidaria dotata*, *Lithosia griseola*, *L. lurideola*, *Acidalia interjectaria*, and some other species also seem fairly normal as to dates. I have made one addition to my Sandown Macrolepidoptera list, a worn but quite recognizable specimen of *A. inornata*." August 13th, 1896.—Exhibits:—Mr. Bishop: *Macaria liturata* from Oxshott, *Zonosoma porata* and *Plebeius aegon* from Tunbridge Wells, and a Dipterous parasite bred from a larva of *Pseudoterpnina pruinata* found in Epping Forest; Mr. R. W. Robbins, *Stauropus fagi*, *Ellopiopsis prosapiaria*, and *Aspilates strigillaria* from Oxshott, also *Limacodes testudo* from Chattenden, and a specimen each of *Parnassius apollo* and *Coenonympha arcania* from Lucerne. Mr. Jennings said Lepidoptera had been observed freely this year by his friend Mr. Harwood of Colchester, who had seen a specimen of *Sphinx convolvuli* on July 3rd. Mr. Prout wrote from Sandown "After the 27th July, sugaring became somewhat unproductive, and with the exception only of one or two nights has continued so. The species are, however, decidedly early, and I have the pleasure of recording the advent of a lovely *Leucania albipuncta* (in "bred condition")

yesterday week, being full a fortnight early,—Aug. 3rd, this year as against Aug. 13th. in 1894, and Aug. 19th, 1895. Since then, I have been favoured with a strong and cold N. or N. E. wind *every* night, but to-day the wind has shifted to the W., and I am hoping for better luck, though the wind is still a great deal too strong. A few nights have been devoted to work under the cliff, between Sandown and Shanklin, the "*phragmitidis* ground," as we call it; a few lovely specimens of the red var. of *phragmitidis* have turned up, and I had the pleasure of re-discovering *Coenobia rufa*, after an absence of some five years; I have taken about a dozen. By the way, it is quite noteworthy how many of my old friends are returning this season after an absence of some years. I believe I mentioned *Zygæna trifolii* in my first letter, and I am able to add *Spilosoma fuliginosa* (a ♂ and two ♀s); the latter have both, as usual with this species, laid freely; *Acidalia emarginata*, one specimen only; *Pirula sriccalis*, also one only; *Ligdia adustata* larvæ (quite a large number in the spindle tree, from which I obtained a lot in 1893); *Dicranura furcula* larva, one in the shallows whence I obtained two in 1893; and I believe one or two other species. I have made one more addition to my Lepidoptera list, having this afternoon captured a specimen of the local *Spilodes sticticalis*." Mr. Lovis reported SUGAR A FAILURE at Margate. Mr. Rose reported that larvæ of *Spilosoma urticae* from BROXBORNE had pupated. Mr. C. B. Smith had been spending a week at CROMER, where entomological collecting had not been very successful, but he recorded the following species: *Macroglossa stellatarum*, *Eugonia polychloros*, *Colias edusa*, *Arctia fuliginosa*, *Bryophila perla* (plentifully), but no *B. muralis*.

REVIEWS AND NOTICES OF BOOKS.

INSECTS AND SPIDERS.—THEIR STRUCTURE, LIFE-HISTORIES AND HABITS, BY J. W. Tutt, F.E.S. [Published by George Gill and Sons, Minerva House, Warwick Lane, E.C. Price 1/-, 116 pp., 8 plates and numerous woodcuts.]—This little book consists of 15 chapters, giving structural and characteristic details of the various orders of insects. These are entitled, "General external characters of insects," "Internal organs of insects and their functions," "Metamorphosis of insects," "The Earwig," "Locusts and Grasshoppers," "Dragonflies," "Caddisflies," "Butterflies and moths," "Beetles—Cockchafer, Burying Beetles, Boring Beetles, Glowworms," "Flies—House-fly, Crane-fly, Gnats," "Social Insects—Bees, Wasps and Ants;" "The Honey Bee," "Wasps," "Ants," "Spiders." As a sample of the contents, the following paragraphs from the chapter on "Metamorphosis" will show the character of the work.

"ECYDYSIS.—The shedding of the skin is usually explained as taking place because of the increasing size of the insect, but this is hardly a satisfactory explanation, for the skin, even at the time of exuviation, is capable of considerable extension. The skin itself is composed of a basement membrane, on which is placed the cellular structure or hypodermis, which forms the real skin, the latter being covered by an excretion of chitin, which gives the skin its toughness. It has been suggested that the skin is the organ by means of which much of the waste matter of the body is got rid of, and, if so, it is very evident that a time must come when the excretory power of the skin is reduced

to a minimum. When this is so, a fresh layer of chitin appears to be formed on the surface of the hypodermis, and, after a variable period of time, the old skin, consisting entirely of waste matter and dead cells, is cast off. If chitin, as has been supposed, really consists of the waste matters of the blood, it renders easy of explanation facts connected with excretion, which would be otherwise most difficult to understand."

"HISTOLYSIS. Our observations on the state of the tissues of the pronymph of the blowfly whilst in the pupal stage give us material for reflection as to the changes which take place in the pupal stage of other insects, and, if we examine the condition of the tissues of the pupæ of butterflies and moths at successive intervals, we shall find somewhat analogous characters presented. First, there will be the breaking down of the tissues, or histolysis, as it is termed; then there will be the rehabilitation of the tissues, or histogenesis, during which the tissue is formed anew into the various organs. Histogenesis is, of course, largely dependent on histolysis, since the material used in the rebuilding of the tissues must be obtained from the material which has resulted from previous destruction. During the resting period of the larva and the first stage of the pupal period, histolysis is in the ascendant, whilst in the later pupal stages histogenesis is predominant. The destruction of the tissues is carried on in a remarkable manner. Viallanes explains fully how certain cells, called phagocytes, not unlike the white corpuscles of the blood, enter the tissues which are to be disintegrated. Here the cells become distended, a pseudo-inflammatory process takes place in the tissues, and, at the same time, the larval tissues are broken up and assume a creamy-looking appearance, whilst the buds or germs from which the new organs are to be developed are exempt from the destruction. Of these germs more than sixty have been already detected, and once their growth commences, progress is usually rapid. Certain organs and structures are in progress of rehabilitation, whilst others are undergoing histolysis. There is much yet to be learned of the processes of histolysis and histogenesis, but there can be no doubt that they are very general among all insects in this stage, and are, according to Sharp, probably only exaggerated forms of the phenomena of the ordinary life of tissues, due to greater rapidity and discontinuity of tissue nutrition. It is worthy of notice, that the regenerative buds to which we have referred, and also the rudimentary sexual glands, are derived directly from the embryo, and do not undergo histolysis, but remain in a comparatively embryonic condition during the whole period of the growth of the larva, and histolysis of the tissues. When these processes are complete, these cells, utilizing the prepared material now at their disposal, rapidly grow and come to maturity, and, on the completion of the various parts, produce the perfect insect."

REPORT OF THE ENTOMOLOGICAL DEPARTMENT OF THE NEW JERSEY AGRICULTURAL COLLEGE EXPERIMENT STATION. By John B. Smith, D.Sc. [Trenton, New Jersey, 1896.]—This volume is most interesting, not only to economic entomologists, but also to systematists and general students. The chapter entitled, "The relation of insects to fruits," is remarkably interesting. The illustrations are both numerous and well-executed.

ERRATA.—p. 151, line 4, for "*third oblique*," read "*first oblique*"; p. 138, line 11, for "*Chrysocephala*," read "*Physocephala*."

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MIMICRY.

V.—THE ORIGIN OF LEAF-MARKINGS AS A MIMETIC PATTERN (CONTD.).

By J. W. TUTT, F.E.S.

There can be no doubt, Weismann considers, that the leaf-markings readily admit of production by natural selection in the manner suggested by Darwin and Wallace, and that, by the method they have explained, the markings would be developed "with a gradual but constant increase of fidelity," provided a single condition is fulfilled, *i.e.*, "the occurrence of the right variations at the right place." But he suggests that some persons may consider this condition to be an insurmountable barrier to the explanatory power of this principle, and such may ask, "What is to be our guarantee that dark scales shall appear at the exact spots to which the midrib shall be prolonged? That still later such dark scales shall appear at the places whence the lateral ribs start? That here, also, a definite acute angle shall be accurately preserved, and the mutual distances of the lateral ribs be alike, and their courses parallel? That the prolongation of the median rib from the hind-wing to the fore-wing shall be extended exactly to that spot where the fore-wing is not covered by the hind-wing in the attitude of repose?"

It will be observed that we have now left the "why" of the markings, and reached the "how." Before entering into the detail necessary for the explanation of how it happens that the required variations are always to be found, Weismann deals with some generalisations. He considers that the markings have not risen suddenly, but have been perfected very gradually; that, in one species, they probably "began on the fore-wing, and in another on the hind-wing; and that, in many, they never, until recently, proceeded beyond one wing; in other species they went only a little way, and in only a few did they spread over the entire surface of both wings." He then continues:—"That these markings advanced slowly and gradually, but with marvellous accuracy, is no mere conjecture. But it follows that the right variations at the right places must never have been wanting, or, as I expressed it before, the useful variations were always present."

He then raises the possible objections against the theory of selection. He asks how is it possible that these "useful variations are always present in such long extensive lines of dissimilar variations as have gradually come to constitute markings of the complexity here presented? Suppose that the useful colours had not appeared at all,

or had not appeared at the right places? Or suppose that they had really appeared, but occurred only in a small percentage of individuals?"

Such are the questions he suggests as objections likely to be raised by the opponents of selection. He says that "it is a fact that in constant species, *i.e.*, such as are not in process of transformation, the variations of the markings are by no means frequent or abundant." But is this true? The minor variations in every species are innumerable, and in others even striking variations are abundant. It is, of course, necessary to assume, if we are to accept the explanation of mimicry as put forward by Darwin and Wallace, that the useful variations are always present, but, even in the very simplest cases of selection we must make the same assumption, and also assume that such variations always exist in a sufficiently large number of individuals for the selective process. It must also be borne in mind that every primary modification brings in its train secondary ones, which usually occur in harmony with the primary one.

Having thus reached, as it were, the basis on which mimicry can alone be explained by selective processes, *viz.*, the unfailing presence of useful variations in a sufficient number of individuals for the purposes of selection, Weismann sets himself to discover why it happens that the useful variations are always present, and concludes that "the conception of the selective processes which has hitherto obtained is insufficient, that the root of the process in fact lies deeper, that it is to be found in the place where it is determined what variations of the parts of the organism shall appear—namely, in the germ."

To enter into the whole process of reasoning as to how it happens that every particle of the germ contains, by its multitude of hereditary transmissions, any particular variation that may be wanted, is outside the scope of this paper. Sufficient to say that every independent part, however small (a single scale for example), is "represented in the germ by a *determinant*, that is, by a determinative group of vital units, whose size and power of assimilation correspond to the size and vigour of the part. These determinants multiply, as do all vital units, by growth and division, and necessarily they increase rapidly in every individual. . . . And since there is no more reason for excluding irregularities of passive nutrition, and of the supply of nutriment in these minute microscopically invisible parts, than there is in the larger visible parts of the cells, tissues and organs, consequently the descendants of a determinant can never all be exactly alike in size and capacity of assimilation, but they will oscillate in this respect to and fro about the maternal determinant as about their zero-point, and will be partly greater, partly smaller, and partly of the same size as that. In these oscillations, now, the material for further selection is presented, and in the inevitable fluctuations of the nutrient supply I see the reason why every stage attained immediately becomes the zero-point of new fluctuations, and, consequently, why the size of a part can be augmented or diminished by selection without limit, solely by the displacement of the zero-point of variation as the result of selection."

If, therefore, the vital units which make up a determinant are so variable, either of these variable units may be advanced at the expense of the rest, and will be advanced if of use. The variation, therefore, is guided by utility. It matters not whether their primary constituents be called *determinants* or by some other name, it is of importance to

remember that each is composed of unlike units which struggle among themselves, and that, by intraselection, the struggle ends in the preference of the best, *i.e.*, of the most useful to the organism.

We have now reached that point at which, in spite of some of the earlier statements of the learned Professor, we come to the same conclusion, *viz.*, that internal forces originate all the variations, which give rise to various modifications, whilst the particular line they will follow is determined by their utility to the species. We can understand, too, that the variational units may be absolutely undefined in extent, in one case a scale, in another, the whole wing, according to the needs of the case.

This being so, we find no difficulty in agreeing that, "in the case of the butterfly it rests entirely with utility to decide the size and shape of the spots that shall vary simultaneously in the same direction. At one time, the whole under surface of the wing appears as the variational unit, and has the same colour; at another, the inside half, which is dark, is contrasted with the outside half, which is bright, or the same contrast will exist between the anterior and posterior halves; or, finally, narrow stripes or line-shaped streaks will behave as variational units, and form contrasts with manifold kinds of spots, or with the broader intervals between them, with the result that the picture of a leaf or of another protected species is produced."

Thus we see that the germ substance of every scale varies indefinitely, that the particular variations can be selected by natural causes, environment, etc., that the choice of selection depends upon the respective degree of utility which each variation may have to the species, and thus we see the harmony of the direction of the variations with the requirements of the conditions of life.

Notes on Apions and their Larvæ.

By CLAUDE MORLEY, F.E.S.

The majority of coleopterists will probably agree with me when I say that among the whole of our British beetles, there is no more interesting genus than the Rhynchophorous one of *Apion*. This so generally expressed interest is caused rather from the similarity of form, structure and habits, than is the interest in *Chrysomela* or *Ceuthorhynchus*, also great favourites, the species of which are so diverse in their *modus vivendi*, that one rarely finds more than two kinds in one situation or upon one plant. *Apion* is one of the most extensive genera we have in Britain, the most extensive, in fact, with the exception only of *Homalota*, and comprises 77 species, all bearing so strong a "family likeness" in superficial facies, that they are scarcely likely to be ascribed to any other genus (unless it be *Nanophyes*, to which *Apion vernalis* very nearly approaches to the casual observer, and which some writers consider of nearer affinity to *Apion* than to *Cionus*, where it is now placed), when one once has an idea of one or more of the members. Upon the face of it, it would seem that 77 beetles, all so much alike that their genus cannot be doubted, even by the novice, must be extremely difficult to distinguish *inter se*, and in one group of a dozen species, this certainly is so. This is known to (and execrated by) coleopterists as "the red-legged group," and it is

certainly rendered a matter of extreme difficulty and much study, to pronounce with any degree of certainty upon most of its members. Their outline is very similar—some are certainly a little shorter, and some a little longer than others, but it takes the trained eye to see even this without comparing the different species. In one, again, the 3rd and 4th joints of the antennæ are conspicuously broad in the ♂, but this peculiarity is wanting in the ♀, and therefore, to a certain degree, fails as a specific distinction. But the remaining species of the genus are easily identified, primarily by the formation and colour of the rostrum, antennæ, elytra and legs.

The whole genus is phytophagous, and consequently, for its successful working, one should be something of a botanist; this is only necessary, however, to a very moderate extent, since so many species feed upon the same or allied plants, that one might almost (though not quite) divide them up into groups according to the food of the various sections. Thus no less than 37 species feed upon *Leguminosae*, 10 upon *Polygonaceae*, 8 each upon *Compositae* and *Labiatae*, 2 upon *Mercurialis*, and 1 each upon *Sedum*, *Statice*, *Urtica*, *Betula* and *Salix*. The food-plants of one or two species, such as *A. affinis*, which, however, is found beneath broom, *A. curtisi*, generally taken in sandy places on the coast, *A. pubescens*, beaten from willows, and *A. filirostre*, are not yet known with any certainty. These are all very restricted species, and a thorough examination of their particular *locale* would probably show some plant peculiar to it, which might prove to be their *habulum*.

The predilection of these beetles for *Leguminosae* is often deplorable, since, given favourable meteorological conditions, they will work great havoc among the farmers' most precious crops of *Trifolium* and *Vicia*, nor is it possible to save the clover, &c., by any process of syringing. The only thing to be done is to burn the whole crop, along with the Apions, when in full flower, and so ensure, as far as is possible, against a repetition of their depredations the succeeding season. This is by no means an easy matter to accomplish with any certainty, since the insects fly with considerable velocity, and are thus enabled to seek "pastures new" (literally) at pleasure. Most curious and unaccountable is the error into which Rye fell when he said that these beetles were apterous. Anyone wishing a proof of their abundance should swing a net backwards and forwards through the air, anywhere—highway, hedge, or hillside—in the country, on a hot summer's day, for five minutes, and, upon examination, he is sure to have taken several *Apion flavipes*, and perhaps other species besides.

The *Apion* larvæ are small white or yellowish-white grubs, with hard heads, like those of *Cossus*. The majority live in the flower-heads of their food-plants (hence, burn the clover when in flower, as the insects cannot then escape). Many make galleries in the stems, or live in the pods, or in a gall* on twigs or leaves, generally on the under-side of the petiole of the latter, and a few mine, like *Hepialus*, within their roots. To one species—*Apion minimum*—Canon Fowler draws especial attention. It is, it would seem, the only species in Britain whose larva lives upon trees (I think it doubtful whether that of *A.*

* These galls, as in the case of *A. scutellare* on *Ulex nanus*, resemble a string of threaded beads, and are said to in no way interfere with the growth of the bush.—C.M.

simile attacks the birch, although the imago is generally found upon it), and this in no ordinary fashion, for it is apparently parasitic in the galls of a *Nematus*, according to Perris, or those of a Dipteron, according to Kaltenbach, on the underside of the leaves of *Salix ritellina* (the white willow).

Most of the species of the genus are not uncommon (the *Leguminosæ*-feeders often only too abundant), although those that affect the *Labiata* are local, and for the most part restricted to chalky districts, and there are a few great rarities: *A. lacrigatum*, Kirby, is probably now extinct as a British species; it originally occurred at Birch Wood, Kent, where its larva fed upon the terminal bud of *Filago gallica*, but its locality is now destroyed. *A. semirittatum* was once taken in numbers at Margate, many years ago, on *Mercurialis annua*, and has not been seen since. Of *A. opeticum*, two specimens only have occurred in Britain—at Hastings; it feeds upon *Orobis* and *Lotus*, on the coast; in which situation, but upon *Sedum album* and *S. acre* (the biting stone-crop), *A. sedi* occasionally occurs. *A. cerdo* is generally considered the only essentially northern species, yet I hear from Mr. Elliman that he took it in goodly numbers at Chesham, Bucks., last spring. *A. astragali*, still a very rare species, was, I believe, originally discovered as British by Kirby, in his parish of Barham, Suffolk, but I never had the good fortune to turn it up hereabouts.

SCIENTIFIC NOTES AND OBSERVATIONS.

ON THE HYBERNATING STAGE OF PARARGE EGERIA.—Mr. Tutt, in his most interesting article on “The hibernating stages of British Butterflies” (*Ent. Rec.*, vol. viii., p. 101), in reviewing the evidence with regard to *P. egeria*, says, “there is not the remotest doubt that if the pupæ were found in the autumn, they would have emerged the same autumn, and if in spring, that they had spent the winter as larvæ;” but I think there is a doubt, as the following will show. On the 26th July, 1892, I captured a good number of the butterflies in the New Forest (the majority at sugared tree-trunks, by the way), and on the following day obtained ova, which hatched on the 7th August. One larva at once outstripped its relatives, feeding so rapidly, that by the 1st September it was ready to pupate, and emerged—a fine female—on the 19th. The remaining larvæ fed more steadily, and pupated from the 20th to 27th September, about 30 in all. I was under the impression that if they did not emerge that autumn they would perish, and therefore kept them in a warm room, the result being that one butterfly put in an appearance on the 16th November, followed by others on the 19th and 22nd, and 2nd, 5th, 8th, 15th, 20th, 23rd, 29th, and 31st December. Now, going back to the 20th November, on that date I thought I would, by way of experiment, place eight pupæ out of doors, and this I did. They remained fully exposed to the intense cold of the winter, which was a severe one, and retained their beautiful green colour until the 28th March following, when they commenced to tinge with a faint brown. The butterflies from these emerged 1st April (2), 3rd (1), 4th (1), 5th (1), 6th (2), and 9th (1), thus it will be seen that the whole 8 came to maturity, *having passed the winter as pupæ*. Of course this does not prove that they naturally pass the winter in this stage, but it undoubtedly

shows that they can. There is a noticeable difference in the coloration of these insects, those that emerged in April, 1893, having the undersides of a warmer brown tint, and more suffused than those bred indoors in 1892, the latter having the undersides lighter, with, in some cases, the darkening of the edge round the hind margin of the hind-wings much more pronounced.—HERBERT WILLIAMS, Hornsey Rise, N. August 15th, 1896.

PUPAL SPINES USED FOR CUTTING THE SILK OF COCOONS.—In looking over the *Entomologist's Record* (vol. viii., No. 6) I was much interested in the review of Kirby's work on "Butterflies," by J. B. I was surprised to learn of the many errors pointed out, especially as the work emanated from a man of Mr. Kirby's standing. J. B. seems to be ignorant of the fact that some moths cut their way out of the cocoon by means of a "strong spine." *Actias luna*, for instance, has these so-called spines. In *A. luna* the organ is hard (chitinous), and black in colour. It is in the form of a serrated spear, or, in other words, is a pointed saw. There is one of these spines on each side of the thorax, and when the moth is ready to emerge, it spins around in the cocoon, and alternately drives the saws through the silken cocoon. There are then two movements which would be analogous to a man turning on a pivot, and elevating one shoulder and then the other. The cutting through the silk and the harder parts of the cocoon can be heard at quite a distance. This cuts a circle in the end of the cocoon, but the circle is not freed, all the strands probably not being severed. I think it would be impossible for an *A. luna* to emerge with the aid of the acid fluid alone. This must all be quite familiar to you, but should have been stated, as many of your readers may accept J. B.'s query as implying a doubt of the fact.—HENRY SKINNER, Prof. Ent., Acad. Nat. Sci., Philadelphia. [We are disposed to think that J. B.'s query was intended to throw doubt on the suggestion that the spines referred to are placed "under the wings of the moth." Dr. Chapman has described (*Ent.*, xxiii., p. 94) a remarkable cutting instrument in the pupa of *Hybocampa milhauseri*, but this is placed on the head; those of *Actias luna* are placed on the thorax. These cutting instruments are pupal structures, and cannot very well be placed "under the wings of the moth."—ED.]

APHOMIA SOCIELLA IN THE NESTS OF BOMBUS AND VESPA.—Last autumn, in examining a nest of *Bombus agrorum* [*muscorum*] I found a large colony of larvæ among the moss. The greater part of the wax of the cells had been devoured, and the honey run out, and as a consequence the inhabitants of the nest had nearly all gone away or perished. This was about the end of August. I removed the nest with the larvæ to a large glass with bell top, and after the larvæ had spun up into a hard mass the size of a cricket ball, I placed the glass in a cool place. On taking it out, the first week in June, I found that the moths—which turned out to be *Aphomia sociella* (*colonella*)—were beginning to emerge, and by the middle of June the mass had yielded up its occupants, which included some ichneumons and Braconids. I examine very many nests every year of the carder bees, and always find a few larvæ, but only now and then a large colony. I have never found them in the underground nests, either of bees or wasps. Another colony of *A. sociella* I bred had migrated from a nest under a Wellingtonia in a garden lawn, and spun up a large ball

composed chiefly of the dead needles of the tree. Both sexes of this moth will come in freely to light. P.S.—Since writing the above I have found that a colony of these moth-larvæ have taken possession of a deserted nest of *Vespa sylvestris*, which I had been watching. This wasp is an early builder, and the queens and males fly out at the beginning of August. The nest—which was in a cavity of a stump, a few inches inside—was a small one, and it is difficult to imagine what the larvæ could feed upon, there being no honey or wax.—W. H. TUCK, M.A., Tostock House, Bury St. Edmunds. August 15th, 1896.

OVA ATTACKED BY ICHNEUMONS.—I have lately had two more instances of ichneumonised ova. (1) Some large ova discovered on a piece of clean stick, possibly *Bombus rubi*, each egg contained a number of small Ichneumon flies. This side branch of our science appears particularly interesting when one comes to think of the marvellous instinct which guides so small a fly, first to find the ova, and secondly to place the right number of eggs within each ovum, so that each larva shall be provided with sufficient nutriment to bring it to maturity. (2) This was a batch of small ova on the underside of willow, each ovum only producing a single fly. Surrounded as they are in every stage by numberless enemies, it is indeed wonderful how the lepidopterous insect ever arrives at perfection, and its race perpetually continued; true, some have become extinct, persecuted by collectors, and possibly finished by Ichneumonides.—C. BINGHAM NEWLAND, Killetra, Mallow, co. Cork. August, 1896. [Other cases are recorded, *Ent. Record*, vol. v., p. 253, vol. vi., pp. 32 & 33, &c.—ED].

THE TYPE OF LEDERERIA.—A recent study of the species of *Luperina*, Lederer (nec Boisduval), and the literature has brought me to the conclusion that the type of *Ledereria*, Grote, 1874, must be considered to be *circens*. The contents of the genus *Luperina*, of Lederer, comprise the types of at least three distinct genera. According to my researches, the type of *Celaena*, Stephens, would be *haworthii*.—A. RADCLIFFE GROTE, M.A., Roemer Museum, Hildesheim.

VARIATION.

CAPTURE OF THE BLACK ABERRATION OF LIMENITIS SIBYLLA.—While collecting in the New Forest, on June 27th, I captured a splendid specimen of the black variety of *L. sibylla*.—H. BROUGHTON, 17, Riverdale Road, Plumstead, Kent. August 4th, 1896.

THE BLACK ABERRATIONS OF LIMENITIS SIBYLLA.—In working out the variation of this species for my recently published work, *British Butterflies*, I found that the specimens which we know collectively as “the black variety” of *L. sibylla* are divided into three distinct aberrational groups on the Continent. The narrow-banded form is the ab. *angustata*, Stdgr. The form in which the band is reduced to separate spots is ab. *staenotaenia*, Honr., whilst the wholly black form is the ab. *nigrata*, Weym. It would be well if the correct name were applied to future records.—J. W. TUTT.

ABERRATIONS OF TRYPIAENA PRONUBA.—Failing other species at sugar, I have been collecting the various forms of *T. pronuba* at sugar, and the following notes upon them may be of interest. (1) *Pronuba*, Linn.—Very rare. I took one very small specimen in 1893, and a second of the ordinary size with a dark reniform and very slightly

paler costa this year. (2) ab. *ochrea*.—Common, but not so abundant as are intermediates between this and ab. *rufa*. (3) ab. *rufa*.—Very common, rarely with a pale orbicular. (4) ab. *brunnea*.—Very common, and merging gradually into ab. *innuba*. Some are very unicolorous, others have the reniform filled with bluish black. Many have very pale orbiculars. (5) ab. *innuba*.—Not very common, varies in the same manner as ab. *brunnea*. (6) Of the pale costa forms, I have a series of all ground colours from ab. *ochrea* to ab. *innuba*, and one beautiful ab. *distincta-caerulescens*.—H. H. CORBETT, M.R.C.S., 19, Hallgate, Doncaster. August, 1896.

ABERRATION OF *BUPALUS PINIARIUS*.—On June 16th, whilst hunting for *Emydia cribrum*, in which I was moderately successful, I took a curious aberration of *B. piniarius* ♂. I was struck by its warm coloration as it flew past, and therefore took it. The right fore-wing and both hind-wings are normal, except that the usual ground-colour is replaced by a warmer tint, something like that of a male *Pidonia atomaria*. The left fore-wing is of a warm brown, like the usual tint of *B. piniarius* ♀, but with a strong black streak from near the outer margin to the middle of the wing, and other slighter dark dashes.—J. C. MOBERLY, M.A., F.E.S., 9, Rockstone Place, Southampton.

THE BLACK VARIETY OF THE PUPA OF *PARARGE MEGERA*.—I reared some fifteen *P. megera* to get the black pupa, and was pleased to get two of them. I think the environment has something to do with the matter, but I must experiment carefully again, and will then let you know the result. There seem to be no intermediate forms.—J. J. WOLFE, Skibbereen, co. Cork.

ABERRATIONS OF *ODONESTIS POTATORIA*.—A number of the larvæ of this species were collected this season at Angmering (Sussex), and the imagines resulting show a great range of variation. Quite a large proportion of females have the coloration of the male, and they form a very striking series.—ALFRED T. MITCHELL, Gunnersbury, W. September, 1896.

SATURNIA PAVONIA (CARPINI) HERMAPHRODITE AND DARK ABERRATION.—I had the good fortune to breed this interesting example last May. I had a large number of pupæ, and this specimen was the first to emerge. The parents were twice inbred, resulting from larvæ taken at Wicken in 1893. The left primary is that of a male, but the secondary on the same side has only about one-fifth of the area with male coloration, just reaching the eye-like markings. On the right side, both wings have the normal female coloration. *Antennæ* left and right, male and female respectively. Only one other specimen was at all remarkable, viz., a dark female approaching a melanic form.—A. T. MITCHELL, 5, Clayton Terrace, Gunnersbury, W. September, 1896.

NOTES ON LIFE-HISTORIES, LARVÆ, &c.

EGG OF *TROCHILUM CRABRONIFORME* (BEMBEICIFORME).—The egg is oval, laid flat on the underside of a sawfly leaf. The colour, rich red-brown (almost mahogany-brown); length to breadth as about 3 : 2. Depressed on top, and at one of narrow ends (micropyle?). Egg under $\frac{2}{3}$ lens appears quite smooth—under $\frac{1}{6}$, minutely pitted. The eggs appear to be generally laid in couples near midrib of leaf, but variable

in both particulars, 2, 3, 4, 5 and 6 eggs being found on some leaves, whilst sometimes they are placed well away from the midrib.—J. W. TUTT.

PUPATION OF *APAMEA OPHIOGRAMMA*.—Mr. Thornhill was good enough to send me four larvæ of this species to determine for him. Having no convenience here to keep species of this description, I cut the stalks of grass he sent with them into pieces, about two inches long, and kept them in a tin box. They fed up in the stalks, and threw out the frass very freely, and made no difficulty about pupating in the stems after the fashion of a *Nonagria*. The stalks began to get a little dry, so I placed a piece of wetted blotting paper in the tin with them. A very fine specimen emerged on the 15th, another on the 16th, a third on the 17th, and the last on the morning of June 18th.—*IBID.*

SECOND BROOD OF *TEPHROSIA BISTORTATA* (*CREPUSCULARIA*, Dup.).—From eggs sent by Mr. Mason, which hatched during the last week of April, I bred, during the week of June 16th-23rd, several specimens of the second brood, all, as usual, rather small, and of the peculiar dead-white ground colour, characteristic of the summer-bred specimens = *ab. consonaria*, Haw. These are particularly well-marked with grey. On June 23rd two larvæ of the same brood were still feeding. These later-feeding larvæ were only about half-an-inch long when the earliest went down. Imagines were found at large on trunks in Chattenden Woods, July 4th.—*IBID.*

PLUSIA MONETA AT ASCOT, HASTINGS, FOLKESTONE, AND WALTHAM CROSS, WITH SOME OBSERVATIONS ON ITS PUPA AND THE COLOUR OF ITS COCOON.—I managed to get *Plusia moneta* again this year at Ascot. The larvæ were full-fed a fortnight earlier than last year. I got others from near Hastings and Folkestone, and a neighbour of mine caught one on the wing here the first week in July. The pupa is rather curious, the leg-cases prolonged until nearly as long as the abdomen, and, just before the moth emerges, the hind pair of legs and the proboscis can be very plainly seen in their cases, but not nearly filling them (*vide*, *Ent. Record*, vol. iv., p. 195). The wing-pattern and colour show through very clearly, and even the specks on the ventral surface of the abdomen, in fact, the whole pupa-case, is transparent, except the dorsal surface, which is opaque and black. The cocoon, if spun indoors, remains white, if out of doors, bright yellow. I tried to get ova from these four different localities; four were laid on the under-side of a leaf of monkshood, but have proved infertile.—E. AUGUSTUS BOWLES, M.A., F.E.S., Myddelton Hall, Waltham Cross. *Sept.*, 1896.

THE COLOUR OF THE COCOON OF *PLUSIA MONETA*, WITH A DESCRIPTION OF THE LARVAL HABITS.—The colour of the cocoon of *P. moneta* appears to depend upon the amount of light to which the caterpillar is exposed at the time of spinning. The silk varies very considerably, sometimes it is lemon colour, at others, rich saffron yellow. When the larvæ first hatch, they are miners, several sometimes inhabiting one mine. After hibernation, they feed in the flowering shoots, partly arresting the growth by nibbling nearly through the shoot, and then attach several leaves together, after the fashion of a Tortricid larva. When half-an-inch in length, they are olive green, with four black dots on each segment, thus, . . . , and two others are placed laterally. The larvæ, at this time, are partly clothed with longish hairs.

Having changed this skin (the 4th or 5th, I believe), they assume their full plumage, and grow rapidly to full-size. The contrast, in the length of time in which they do this, and that in which they pass their previous stages, is remarkable.—SYDNEY WEBB, Dover. *Sept.*, 1896.

THE LARVA OF *PLUSIA MONETA*.—Whilst staying at Tunbridge Wells for a few days, at the beginning of May, I found, on a plant of monkshood, a half-grown larva of *Plusia moneta*. It was enclosed in a slight web among its food-plant. It turned to a pupa on May 21st, and produced a fine moth on June 10th. The LARVA may be described as follows:—Colour when half-grown, dark olive green, with numerous black spots on each segment; an indistinct spiracular line; head, and legs black; claspers, green. After the last moult it assumed a light grass-green colour, with a dark dorsal stripe, and spiracular line lighter. Larva scattered with minute hairs. On the 31st May a pupa was brought me from the same locality, which was found spun up among larkspur; this produced a moth on June 13th. I may mention that the colour of the cocoon enclosing the pupa, from the larva found on monkshood, was quite white; whereas that found on larkspur was of a golden yellow.—H. W. ANDREWS, Victoria Road, Eltham, S.E. *August*, 1896. [The larkspur pabulum is important and interesting.—Ed.]

NOTE ON THE EGG-LAYING OF *HADENA DISSIMILIS* (SUASA).—A dark specimen of *Hadena dissimilis*, caught at sugar on the night of June 21st, at Chattenden, was enclosed in a tin box, in which a depression ran round at some little distance from the rim. One batch of eggs was laid in four regular rows, about half an inch long, in this rim, over which two other rows of equal length were placed. Another batch, practically continuous with the first, consisted also of four rows, about half an inch long. The female then seems to have shifted her position, continuing the upper two of these rows for another quarter of an inch, and completing the regulation four rows by commencing two others directly above where the two lower ones left off. These two upper rows were then continued alone for about three-eighths of an inch. The eggs appeared to the naked eye to be of a pale flesh-colour when first laid. They changed to a delicate violet or purplish tint on the fourth day after being laid. The eggs hatched on the afternoon of June 29th.—J. W. TUTT.

DESCRIPTION OF THE OVUM OF *ZEPHYRUS BETULÆ*.—In the *Entomologist's Record* for June 15th (p. 92), a description of the egg of *Z. betulæ* is asked for. The following description was made from nine ova, deposited in captivity on August 27th and 28th, 1895. I had observed the same female laying freely before I netted her. POSITION.—All were firmly attached to the main twigs, at the base of a smaller twig, thorn, or small excrescence. Five of the eggs were placed on separate twigs, two on one twig, a quarter of an inch apart, while the remaining two, on another twig, are in actual contact. COLOUR.—Pure white. SHAPE.—The ovum rises in the shape of a depressed sphere to about five-sixths of its entire height, above which it is continued in the form of a cap. MARKINGS.—Under the lens the egg is seen to be beautifully and perfectly ribbed with minute ridges, which divide it into hexagonal cells, giving it a honeycomb appearance. The array of these cells is very conspicuous when

viewed sideways. Before reaching the cap-like top, the cells gradually increase in size. At the topmost point there is a comparatively deep depression of small circumference.—H. L. WOOD, Old Grammar School House, Ashford, Kent. *August, 1896.*

BREEDING *TENIOCAMPA MINIOSA*.—This species was exceedingly abundant in the New Forest, at the end of May, on dwarfed oaks outside the plantations, and I found many in the webs that served as their nurseries. What a difficult species this is to breed! I have tried for three seasons to get a good series. I have brought home hundreds of healthy larvæ, and have sleeved them out on growing oak. They have fed up nicely, and then, one night, have eaten holes in the sleeve and disappeared. Now I bring them in when in the last skin, and keep them in a breeding cage with sand in the bottom, but they produce very few pupæ. They go flabby, hang by the two middle claspers, and go bad and smell most evilly. They produce numbers of ichneumon cocoons, and even if they go down in the sand and make a cocoon, they, as often as not, go bad in it. Can anyone tell me how to breed them, supposing I have any patience to try again?—E. A. BOWLES, M.A., F.E.S., Myddelton Hall, Waltham Cross. *September, 1896.*

DESCRIPTIONS OF GEOMETRID EGGS.—EGG OF *ANGERONA PRUNARIA*.—Small for size of moth. In shape a somewhat flattened oval, attached by long side. Length to breadth as about 3 : 2. The ends gently rounded. A depression on the top surface occupying about one-third of the area and situated rather nearer one end than the other. Colour at first pale green, then, on second day, gradually changing to a reddish hue with a tinge of green around the depression on upper surface of egg. The egg appears to be minutely pitted. [The foregoing was made under a two-thirds lens]. Under a one-sixth lens very little more can be made out, except that the pitting is made up of exceedingly minute polygonal cells, running in oblique, curved series from the depression at the top to the attached side of the egg. The sloping walls of the depression appear to be made of still more minute cells. The two ends are somewhat evenly rounded with no appreciable trace of the micropylar depression. The red colour assumes under the higher power a somewhat crimson hue and appears to be more confined to the ends, the upper and lower surfaces being much greener. Eggs laid, June 27th. Description made, June 30th. Hatched, July 9th.

EGG OF *ACIDALIA SUBSERICEATA*.—Oval in shape, laid on its long side, long side to short side about 4 : 3. Very pale yellowish at first and then changes colour slowly until in about four days it appears to be of a deep orange colour to the naked eye. Under a $\frac{1}{6}$ lens, it is seen to be of a pale orange colour, with somewhat irregular patches of reddish orange scattered sparingly over the egg. These are sometimes almost dark enough to be called blood coloured. The egg is beautifully pitted with minute, but regular depressions, and the upper surface of the egg (*i.e.*, the surface opposite to that by which it is affixed) has a long central depression, the sloping sides being apparently composed of somewhat smaller and finer cells than the pits which ornament the sides. Two or three of the dark orange-red spots always surround this rim. The eggs remained deep orange during the fifth day, but on the sixth became somewhat blackish, the depressed area retaining some of its orange tinge. The eggs hatched

on the seventh day from deposition (June 27th), and the young larvæ, black and white ringed, fed rapidly on knot grass (*Polygonum arifolium*). [Compare *E.M.M.*, vol. xi., p. 116, where Mr. Porritt describes the egg of *A. straminata*.]

EGG OF *ACIDALIA TRIGEMINATA*.—Of a distinct oval in shape, laid on its long side, the long side to the short side apparently as about 4 : 3. Very pale pearly-white when first laid, changing to a dull leaden colour before hatching. The surface is completely covered with regular pits somewhat hexagonal in shape extending from the depression in the upper face to the base in oblique curves. This central area forms a comparatively large depression on the centre of the upper face, somewhat irregular in shape, its sides formed of minute cells. The eggs were laid on June 21st.

EGG OF *ACIDALIA MARGINEPUNCTATA* (*PROMUTATA*).—The eggs are laid somewhat irregularly, but glued so firmly that they cannot be removed from the object to which they are attached without injury. The egg is somewhat oval in shape, with the micropyle at one of the narrow ends. It is usually laid flat on its long side, but sometimes tilted by overlapping an adjacent egg. The length : breadth : height as 6 : 3 : 2. With the naked eye the mature egg appears to be of a deep salmon colour. Under a two-thirds lens, the egg is pale yellowish in colour, with so much pinkish marking as to give the idea of an almost entirely pink egg. It has a depression on its upper surface placed towards the base, *i.e.*, the narrow end opposite that which bears the micropyle. This depression occupies about one-fourth of upper area, and gives to the egg (viewed from above) a distant resemblance to a slipper. About 13–15 longitudinal ribs can be counted, running from micropyle to opposite end. The micropylar end forms a terminal rosette, pale yellowish in colour, in the centre of which the tiny micropylar cells are barely distinguishable (under a one-sixth lens). Under a one-sixth lens, the resemblance of the egg of this species, especially if it be tilted as it were on another egg, so that its base (end opposite micropyle) partly rests on the ground, to that of a Pierid, is very remarkable. The depression on the upper surface is not strikingly conspicuous. There is a slight narrowing from the middle towards the micropylar end, and the longitudinal ribs in view are about 13–15. Some of these unite and so lessen the number in the micropylar area, *i.e.*, at the true apex of egg. The longitudinal ribs are faintly crossed with transverse ribs. If the depression mentioned above as occurring on the upper surface could be removed, and the egg set up on end, instead of on its side, we should have an egg very like the nine-pin egg of some Pierids. The empty egg-shell is perfectly transparent. [Eggs laid about August 19th ("pale straw colour when first laid," H. E. Page), described August 29th, hatched September 3rd.]—J. W. TUTT. August, 1896.

DIANTHOCIA COMPTA BRED.—I have sent you a *D. compta*, recently bred from a larva taken at Mendel, just below the Pass, on the Botzen slope, from a *Dianthus* (name unknown) capsule.—T. A. CHAPMAN, M.D., F.E.S., Hereford. July 5th, 1896.

EGG-LAYING OF *CENONYMPHA PAMPHILUS*.—Eggs of *C. pamphilus* are easily obtained, as the species lays very freely in captivity. I doubt if the food-plant is even necessary, they seem to neglect it so. Most of the eggs obtained this year were laid on the netting on the top of the case. At first they are of a pretty green colour, and as, in captivity at least, they always seem (when they do lay on grass) to select

the withered pieces, they are very conspicuous, but, after a day or two, they become of a dull brown, and are by no means so easily noticed.—J. J. WOLFE, Skibbereen, co. Cork. *July*, 1896.

PARTIAL THIRD BROOD OF *TEPHROSIA BISTORTATA*, AND PARTIAL SECOND BROOD OF *SPILOSOMA LUBRICIPEDA*.—The following emergences may be worth recording. (1) On August 17th, an imago of a third brood of *Tephrosia bistortata* (*crepuscularia*) came out in one of my cages, from some pupæ that went down between July 27th and August 5th. It is similar to the perfect insects of the second brood, and was bred from an egg laid by a female bred from a Clevedon first brood. On the other hand, I have some pupæ from another Clevedon first brood, that went down during the second week of June, which have not produced any second brood, but are going over till next March. All the pupæ have been kept under similar conditions, in an out-house facing north-west. (2) On August 23rd, I found a ♀ *Spilosoma lubricipeda* (2nd brood) had emerged from pupæ that spun up at the end of July. The insect is a fine intermediate var., and this is the fifth year of selection of imagines originally from larvæ at Hull.—W. S. RIDING, B.A., M.D., F.E.S., Buckerell, E. Devon. *August 29th*, 1896.

NOTES ON *POLIA XANTHOMISTA* VAR. *NIGROCINCTA*.—I have not had much experience in breeding this species from the egg, as I generally try to collect the larvæ when full fed at the end of June, but the eggs which I have had here, all hatched in the spring (about the beginning of April). On referring to a letter from Mr. C. S. Gregson, of Liverpool, to me, dated February 27th, 1892, which accompanied a batch of eggs of *Polia chi* var. *olivacea*, which he very kindly sent to me, he states, *inter alia*, as follows:—"Like *P. nigrocincta*, they (*olivacea*) generally hatch in April, but not always. I have known both species to hatch in autumn." I can quite imagine, however, if the weather be very warm in September and October (similar to that which was experienced here last year), that the eggs would hatch in the autumn, and the young larvæ, which feed on various low plants, would take readily to either common plantain, sea plantain, violets, dandelion, buttercup, etc., etc. I know of numbers of other plants upon which the larvæ also feed. I have fed them on the plants named, and find that they do not take to *S. armeria* until later on, say May and June, when they prefer the sea-pink flowers, on which they can be found feeding at night. It (*nigrocincta*) is strictly a nocturnal feeder. I have never found the larva during the daytime. My great objection to rearing *P. nigrocincta* from the egg, is that such a large percentage die off, both before and after their last "moult," and this is the reason why I prefer hunting for the larvæ in June.—H. SHORTRIDGE CLARKE, F.E.S., Sulby Parsonage, Lazayre, Isle of Man. *August 28th*, 1896.

NOTES ON COLLECTING, Etc.

CAPTURES AT MALLOW.—The following list of insects captured in the neighbourhood of Mallow, co. Cork, during the present season may be interesting. I observe that *Panolis piniperda* is not mentioned in Newman as an Irish species, although, of course, his book is hardly up to date. An interesting capture appears to be that of *Macroglossa bombyliiformis*, by Mr. F. Stawell, at Old Dromore, near Mallow. My

own captures are: *Panolis piniperda* (larvæ), *Phibalapteryx lignata* (imagines), *Cirrhoedia cerampelina* (larvæ), *Tryphaena ianthina* (pupæ and imagines), *T. interjecta* (larvæ, pupæ and imagines), *Plusia bractea* (imagines), *P. festuæ* (pupæ and imagines), *Poecilocampa populi* (larvæ), *Nudaria mundana* (larvæ), *Cuspidia megacephala* (imagines), *Amphidasys strataria* (larvæ), *Cerura vinula*, *Notodonta dromedarius* (larvæ), *Zygæna filipendulæ* (very abundant), *Pyrameis cardui* (imago). A cocoon of *Arctia caia* was found spun up between needles of Scotch fir, at the end of a branch 6ft. from the ground. The imago has since emerged. Has the larva of this species been known to feed on fir needles? The specimen of *M. bombyliiformis* (the narrow-bordered Bee Hawk) was taken at rest on a gravel path, apparently just emerged, being a perfect specimen.—C. BINGHAM NEWLAND, Kelletra, Mallow, co. Cork. [*Arctia caia* always wanders from its food-plant before pupating.—ED.]

MIMASEOPTILUS (PTEROPHORUS) HODGKINSONI, ETC., AT WITHERSLACK. —The fine weather tempted me to go again to Witherslack, specially to try for *Lita* (*Gelechia*) *junctella*. Some years ago I could generally take this species towards the middle of August, and odd ones hybernated until April. I could, however, not find any specimens on this journey, although I made a fair "bag" of other species—notably among which was *Amphisa gerviniana*, of which, on a rough rocky slope, I captured about a hundred specimens, including only one female. The males are large, superbly fine, and rich in appearance, some half-dozen examples being brilliant varieties. In a rough field I took nice series of *Eupoecilia dubitana*, *E. atricapitana*, and the second brood of *E. ciliella*, one fine *Depressaria pallorella*, three *Gelechia similella*, one *Gelechia* (? sp.), not unlike *knagysella*, plenty of *Dicrorhampha acuminatana* (second brood), and about a dozen of the long-lost "plume," *M. hodgkinsoni*. When I captured the latter, I was reminded of the remark of the late H. Doubleday, who wrote to me in 1863, "You have sent me a new *Tortrix* (*Euchromia rufana*), and also a new 'plume.'" So Henry Doubleday wrote to me, after seeing several specimens. I can, in all, see a light streak (very pale) on the lower side of the upper wing, and the heads of all are of a very pale ash colour, as also are the legs. When pinned and set, the differences between a series of this species and *M. bipunctidactylus* and *M. playiodactylus* are more readily seen. I took some of the latter species with the tips more hooked. In the grounds of Mrs. Cross, I took *Argyresthia andereggella*, whilst *Gelechia rhombella* and *Coccyx ratzeburgiana* from spruce fir, *Gelechia nigrifella* and *G. cinerella* helped to swell the bag. *Crambus tristellus*, large and variable (some brick-red in colour), a black *Plutella radiatella*, together with the pale form with the black streak along the fore-wing, were also taken. I bred a number of specimens of the latter species some years ago from larvæ found feeding on oak growing on the limestone. All were of one colour, pale brick-red, without any markings on the wing. *Erebia æthiops* was out in profusion. *Pararge megera* were fine and brilliant in colour. *Gonepteryx rhamni* were also fine. My captures took me two days to set. I never set anything when from home; insects relax easily, and to keep the damp sand from injuring the cilia, I push the heads of the pins in the sand.—J. B. HODGKINSON, F.E.S., Rosebery House, Powis Road, Ashton-on-Ribble. August 14th, 1896.

ATTRACTION OF MOTHS.—A QUERY.—There is a small outhouse covered with ivy which stands close here, and I have noticed for the past fortnight or more, numbers of *Tryphaena orbona* every night about dark, flying round and alighting upon the ivy leaves. They remain quite passive, and in a little time become stupefied—similar to insects at sugar. On an average, I have seen more than a score of these moths each night, resting on the leaves, also a few *T. junthina*. Can any of your readers inform me what attraction ivy has at this time of the year? and why these insects should become stupefied, so that they fall off the leaves at the least shake? There is some honeysuckle and convolvulus intertwined with the ivy growing over the house referred to, but the bloom on the former was over some weeks ago. Sugar has been useless here throughout July, and even up to the present time fails to prove attractive. Ragwort also has been a failure up to the time of writing.—H. SHORTRIDGE CLARKE, F.E.S., Sulby Parsonage, Lazayre, Isle of Man. *August 15th, 1896.*

CYANIRIS ARGIOLUS IN LONDON.—Is *Cyaniris (Lycaena) argiolus* known as a London insect? On July 28th or 29th I saw a good example sitting on the pavement in the Wellington Road, about 200 yards from St. John's Wood Station. If it is an uncommon visitor, I thought you might like a note of it for the *Record*.—W. F. H. BLANDFORD, M.A., F.Z.S., F.E.S., 48, Wimpole Street, W. *August 14th, 1896.*

LYCÆNA ARION IN THE COTSWOLDS.—This species was not at all rare in the "Cotswolds" this year.—ERNEST W. W. BOWELL, 70, Sinclair Road, West Kensington Park, S.W.

"MICROS" OF A KENTISH WOOD.—Much as one can appreciate our Epping Forest, as a change from town life, it cannot compare with your Kentish wood; such was my impression, when, in May last, I stayed some time in the neighbourhood of the Blean Woods, where the fauna, the clean and sweet flora, the fresh air, etc., gave a natural beauty to the whole, which one would be only too glad to find in our local forest. What little collecting I was able to manage, was done mainly in the rides by beating, and the short list of "micros" may be of interest. *Crambus pratellus*, *Tortrix ministrana*, *Penthina picana*, *Roxana arcuana*, *Eppippiphora scutulana*, *Xanthosetia hamana*, *Adela degeerella*, *A. viridella*, *Gelechia alella*, *Gracilaria swederella*, *Plachista cygnipennella*, *Incurvaria praelatella*, *Agrotera nemoralis*, *Botys fuscalis*, *Herbura cespitalis*, and *Leioptilus tephradactylus*.—AMBROSE QUAIL.

EXCURSION TO TUNBRIDGE WELLS.—On August 3rd, 1896, the members of the North London Natural History Society made an excursion to Tunbridge Wells, which was kindly conducted by Mr. George Abbott, M.R.C.S., secretary of the S.E. Union of Scientific Societies. Botany and geology occupied the greater part of the day, and very few lepidoptera were flying, the commonest species being *Polyommatus icarus* and *Pararge megera*. Near the High Rocks Hotel, however, a good specimen of *Zonosoma porata* fell to the net of Mr. Bishop, and an unusually finely marked example of *Asthena candidata* to Mr. Fuller. Shortly afterwards Mr. Bishop captured another *Acidalia*, which no one of the party was able to certainly name, but which it was thought might be a nice var. of *A. acersata*. Coming out on a breezy heath towards Broadwater Forest, it was discovered that a few specimens of *Plebeius agon* were flying among the innu-

merable *P. icarus*, and Mr. L. J. Tremayne beat a ♂ *Drepana binaria* from a small birch tree, several fine specimens of *Chrysophanus phloeas* being also taken here. Later in the day, at Eridge Rocks, a dead pine tree, completely riddled with small holes, apparently the work of some beetle, was inspected. The heartiest thanks are due to Mr. Abbott for the trouble he took over this excursion.—LAWRENCE J. TREMAYNE.

APORIA CRATÆGI.—I have much pleasure in recording the capture of this supposed extinct British butterfly, in the middle of June last, in a locality where it has previously been taken and recorded by several entomologists.—H. DOUGLAS STOCKWELL, 2, Albert Road, Dover. August 23rd, 1896.

You will be glad to hear that our local tap of *Aporia crataegi* has been almost common this year.—SYDNEY WEBB. September, 1896.

SECOND BROOD OF ACIDALIA SUBSERICEATA.—The breeding of a large second brood of this species is perhaps sufficiently unusual to place on record. From eggs deposited in June last, two broods fed up pretty rapidly, and pupated about the middle of July. On my return (August 23rd), after some weeks' absence from home on a collecting expedition in the Dauphiné Alps, I was astonished to find that some fifty moths had emerged. Most of them were dead and dry, others alive; and two have since emerged (on the 25th inst.).—J. W. TUTT. August, 1896.

"REFLECTIONS AND QUERIES ON THE VALUE OF RARE BRITISH LEPIDOPTERA."—I am sorry not to comply with the Editor's request (*ante*. p. 67, footnote) to give "exact references and captors' names" of more recent captures of *D. ramburialis* (omitting Mr. Digby's), and *E. catalaunalis*, than those made by Messrs. T. and W. C. Boyd respectively. Speaking from memory only, I do not recollect that any more recent captures, with the exception of the Rev. C. R. Digby's, which I have already mentioned, have been recorded, but my remark was that both species had been taken in Britain more recently. This statement, the truth of which as concerns *D. ramburialis* is proved by Mr. Digby's capture alone, was, in the case of that insect, also founded on reliable private information received about British specimens which I have seen, and it is my rule never to publish such without authority: as regards *E. catalaunalis*, it rests on the fact that in his *British Pyralides*, Mr. J. H. Leech, even if his "near London" refers to Mr. W. C. Boyd's Cheshunt capture, has also recorded it from "near Dover." "John Bull" wished to know the ground upon which these two species are considered British, and having shown him, I have no intention of pursuing the subject further: if the Editor is anxious to do so, he cannot do better than write to Mr. Leech, who has published three additional British localities, besides the two mentioned by me, for *D. ramburialis*, and at least one more for *E. catalaunalis*, and to Mr. Sydney Webb, who probably knows full particulars about the Kentish captures of both species. It may be worth mentioning, by the way, that when Mr. J. W. Downing's collection was sold, in 1894, there was in it a specimen of *D. ramburialis* which, to my mind, was almost certainly British: it was set in English style on an English pin, had apparently never been re-pinned, and was doing duty for *D. literalis*, standing with three Pembroke individuals of that species, and being catalogued as received with them from their captor, Mr. C.

G. Barrett, though it had neither been taken by nor come from him.—A COUNTRY COUSIN. *August*, 1896.

PLUSIA MONETA AT WINCHESTER.—I have to record the capture of *P. moneta* at Winchester. I had a worn male brought to me on July 4th.—H. WILDE, Culverlea, Winchester.

PLUSIA MONETA AT BOURNEMOUTH.—On June 22nd I called on my friend Mrs. Jackson, in Bournemouth, and she showed me on her boards the insects she had captured in the Public Gardens a night or two previously. One she did not know, but I saw at once that it was a specimen of *P. moneta*.—W. J. CROSS, Ely.

EUVANESSA ANTIOPA SEEN IN OXFORDSHIRE.—During a walk on the Oxfordshire side of the Thames, on September 7th, I had the pleasure of seeing a fine specimen of *Euranessa antiopa* sail close by me, and settle on the branch of a large elm tree, within two or three feet of where I was. After watching it close and expand its lovely wings, I failed to catch it in my hat, having no net with me.—W. BARNES, 7, New Road, Reading.

ACHERONTIA ATROPOS AT DURHAM.—I beg to record the capture at rest of a fine specimen of this insect, at Framwellgate Moor, near Durham, to-day.—T. MADDISON, South Bailey, Durham. *September 16th*, 1896.

CURRENT NOTES.

PLUSIA MONETA is recorded from Watford (June 19th), Leatherhead (four specimens), Sutton (Surrey, July 5th), Wallington (July 8th), Weybridge (nine specimens), Bromley (three bred, July 29th), Ascot (long series, June 28th), Tring (eight, last week in June and 1st week in July), Ashford and Wye (one each), Hastings, Folkestone, Waltham Cross, Bournemouth, Winchester, &c.

Mr. Thorpe records a curious experience. Last year many moths of *Polia xanthomista* var. *nigrocincta* emerged in his absence, and deposited ova. In November last he discovered ova, part of which had emerged and presumably died, the remainder not hatching until the spring of this year. This will remind the old collectors of a discussion as to the hatching of eggs of this species, in which we believe Mr. Gregson and Mr. Doubleday took part.

The dark aberrations of *Limenitis sibylla* appear to have been more than usually abundant in the New Forest. "Two" are recorded by Mr. Nash, "several (about six)" by Mr. Blathwayt, "some numbers" by Mr. Auld, "one" by Mr. Broughton. We hear that Gulliver caught six. We should be glad of as many records as possible.

The larva of *Acherontia atropos* is recorded as being abundant in Cambridgeshire this year. It is also recorded from Lincolnshire, Herts, Essex, Shropshire, co. Waterford, &c., so that it would appear to be generally abundant.

Mr. Claude Morley has added the Dipteron, *Xysta (Phasia) cana*, to the British list. It was taken on May 23rd while brushing for Coleoptera.

The editors of the *F.M.M.* announce that Prof. Brauer and others have succeeded in rearing both sexes of *Cobboldia elephantis*, an (Estrid, the larva of which lives in the throat of the Indian elephant.

The larva leaves the throat in the early morning, changes into a pupa in from one to two days, and in sixteen days after leaving the host the imago appears.

Mr. Saunders records the ♂ of *Vespa austriaca* and *Odynerus basalis* at Bloxworth. Mr. Piffard records the male and female of *Crabro pubescens* at Brickell Wood, near St. Albans, and describes the female (*E.M.M.*).

Mr. Gardner records *Deilephila livornica* and *Tryphaena subsequa* from Hartlepool in July last.

Mr. J. Harold Bailey, of 128, Broad Street, Pendleton, records *Telephorus paludosus* from Ringleywood (seven miles north-west of Manchester), and offers to send types to collectors requiring the species.

The death is announced, on August 19th last, of Miss Georgiana Elizabeth Ormerod, F.E.S.

Mr. McLachlan (*E. M. M.*) points out that the generic term *Neuronia*, used for the Noctuid moth *popularis*, belongs by priority to the Order Trichoptera, and that, therefore, the Noctuid moth wants another generic name. Perhaps Professor Grote can tell us if one is available.

PRACTICAL HINTS.

Field Work for October.

By J. W. TUTT, F.E.S.

1.—The brown mines of the larvæ of *Antispila treitschkiella* should be obtained on dogwood the first week in October.

2.—The larvæ of *Nepticula lapponica* feed in broad serpentine mines in birch, and are to be found from October 1st—20th.

3.—Bladder-like leaves of *Artemisia vulgaris* should be collected in October for larvæ of *Gracilaria omissella*.

4.—The larva of *Nepticula desperatella* mines the leaves of wild apple trees in October. It prefers the leaves on the small inconspicuous shoots that grow close to the ground.

5.—In October, the larva of *Nepticula headleyella* makes a long and very narrow gallery in the leaf of *Prunella vulgaris*. The affected leaves are of a dull purple colour.

6.—The cases of *Coleophora argentula* are sometimes to be obtained in great abundance in October, on the seed-heads of yarrow.

7.—The orange-coloured larvæ of *Nepticula pomella* are to be found in October and November in the leaves hanging from the lower branches of the apple tree. Sometimes there are as many as half-a-dozen larvæ in a single leaf.

8.—At the end of October, the larva of *Nothris verbascella* is to be found eating out the undeveloped leaves at the heart of plants of *Verbascum pulchellum*. It feeds slowly through the winter, and full-fed specimens are to be found throughout the spring until the middle of June. In July, the pupa is to be found in a slight web, on the underside of the large lower leaves, generally in the angle of two ribs or in the turned-down edge of a leaf.

9.—In October and November, collect the leaves of *Vicia sepium* and *Orobis tuberosus* for mines of *Lithocolletis bremiella*.

10.—Larvæ of *McLanthia ocellata*, *Larentia salicata*, and other

moths, are full-fed in October, spin a silken web, but do not change to pupæ until the spring. Disturbance in this stage is usually fatal.

11.—Macro-lepidopterists should refer to *Ent. Record*, vol. i., p. 187 (No. 7) for an excellent series of "Practical Hints" on "Field Work for October and November," by Mr. W. Holland.

FOOD-PLANT FOR LARVÆ.—I am again feeding the larvæ of *Chariclea unbra* (*marginata*) and *Heliothis dipsacea* on scarlet runner beans (on the green pods), and find that *Hadena pisi* and the *Plusiæ* take to this food so kindly, that I regret not trying *Dianthoeia irregularis* and other *Dianthoeiæ*, as well as many other species on the same.—F. NORGATE, 98, Queen's Road, Bury St. Edmunds. September, 1896.

SOCIETIES.

CITY OF LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—August 18th, 1896.—Exhibits:—Mr. J. A. Clark: a pair of *Nyssia lapponaria*, bred by Mr. W. M. Christy (see *Entomologist*, vol. xxviii.). Mr. Bacot: a specimen of *Dianthoeia conspersa*, and a long series of *D. carpophaga*, bred from capsules of bladder campion gathered at Boxhill; also *Plusia festuæ* and *Leucania littoralis* from Norfolk. Mr. Sanzé exhibited some curios from S. Africa, consisting mostly of ornaments and articles of dress made by the natives, and read some very interesting notes on the habits and disposition of the Kaffirs.

Sept. 1st, 1896.—Exhibits:—PORTHETRIA DISPAR.—Mr. Nicholson exhibited a bred series of large females of *Porthetria dispar*, in which the subterminal line was very strongly developed on all the wings; one specimen had the dot on the fore-wings extended to meet the apex of the V-shaped mark. Mr. Tutt said that he had found the species very abundantly at Aix-les-Bains, Bourg d'Aru, Bourg d'Oisans and Grenoble, in the course of his recent entomological trip to the Dauphiné Alps. He compared the habits of the species with those of *Orygia antiqua*, there being a striking resemblance between the two species, whilst the manner of egg-laying was very similar to that of the *Porthesias* (*P. chrysorrhœa* and *P. auritua*). The female specimens of *P. dispar* at Grenoble were of very large size. CAPTURES AT IPSWICH.—Mr. Frost reported the capture of the following species at Ipswich:—*Apatura iris*, grey form of *Agrotis nigricans*, *A. puta*, with left hind-wing perfect, but much dwarfed, *Noctua umbrosa*, *N. stigmatica*, *N. dahlî*, *Xylophasia scolopacina*, *Triphaena jimbria*, *Aplecta occulta*, *Cerigo matura*, *Dianthoeia cucubali*, *Hydroecia nictitans* and *H. paludis*, among many other species from Ipswich, where he found butterflies scarce (except *Cyaniris argioides*, which was unusually abundant). Moths did not come to sugar till after 10 p.m., and continued till 2 and 3 a.m. COCOONS OF SATURNIA PYRI.—Mr. Tutt exhibited cocoons of this species. They were large, and the silk very dark in colour. Mr. Tutt explained that the silk was coloured after the cocoon was spun, the silk at the time of the formation of the cocoon being rather pale. After the larva had been at work some three or four days, the dark colour was found to have been applied to the silk. The larvæ had spun up among the white paper with which he had lined a little hand-bag, and in which they were carried from Bourg d'Aru to London. The larvæ were found near the former place in the Vénéon Valley, feeding on what he believed to be a species of *Rhamnus*. His attention was first drawn to the bush by the denuded

condition of some of the branches, and then by the large quantity of frass pellets beneath. Pushing the stick of his net into the bush resulted in bringing down a larva, and five others were then found by searching. The larvæ had evidently just attained their last skin, and were covered with striking, long spatulate hairs, which, however, soon wore down to bristles, the hairs arising from the transverse series of turquoise bluetubercles, with which each segment was ornamented. Before pupating, the bright green ground colour became orange dorsally, and then reddish-brown. Other larvæ were seen at Bourg d'Oisans, maimed in the roadway usually, and evidently these had come to grief when searching for a pupating place. Mr. Harrison had also found the larva at Grenoble, and had since captured it in North Italy, in some abundance. CAPTURES IN THE ISLE OF WIGHT.—Dr. Sequeira exhibited lepidoptera taken in the Isle of Wight during the first three weeks of August, including *Spilosoma fuliginosa* and *Notodonta dictaea*, taken on gas-lamps at Ryde; blue females and dwarfs of *Polyommatus icarus*, *Cyaniris argiolus*, which had been very common, and a brassy specimen of *Chrysophanus phlocas*, taken in the spot where, many years ago, he took a specimen of the var. *schmidtii*. Sugar was a failure. Mr. Tutt, commenting on this exhibit, drew attention to the large number of second broods it contained—*Timandra amataria*, *Zonosoma annulata*, *N. dictaea*, and others. FOOD OF LARVA OF ARCTIA CAIA GOVERNING HYBERNATION.—Mr. Nicholson said that he had been informed that, if larvæ of *Arctia caia* were fed on lettuce, they would invariably pupate in the autumn without hybernating. SILK-WORM EGGS HATCHING IN AUTUMN.—Dr. Sequeira recorded that part of a batch of eggs of *Bombyx mori* had already hatched, although only deposited last July. This he considered strange, as the well-known habit of this species is to hybernate in the egg state. It was evidently an attempt to produce a partial second brood. TETHEA SUBTUSA IN LONDON.—Mr. Bate recorded a specimen of *T. subtusa* from Dulwich, where he believed it to be rare. Mr. Tutt said that the larvæ fed on the poplars in gardens at Westcombe Park, and that he had observed the imago occasionally on fences there. WASP NEST ATTACKED BY APHOMIA SOCIELLA.—Mr. Tutt exhibited, on behalf of Mr. W. H. Tuck, of Bury St. Edmunds, a wasp's nest that had been attacked by *A. sociella*. The nest was surrounded by leaves, and one portion of it was of the hard, leathery (or felt) material, which had been so often described as the work of this insect. Mr. Tutt said that it was at first thought that the insect only attacked humblebees' nests, but it is now known that it attacks not only the nests of all the *Bombi*, but also of various species of wasps. The nests are attacked in July and August, and the larvæ continue their ravages until the bee or wasp colony is destroyed. By September the *A. sociella* larvæ spin their long tough cocoons, although they do not pupate until the following May or June. Mr. Tutt also exhibited specimens of the wasp (*Vespa sylvestris*) which Mr. Tuck had kindly forwarded.

Sept. 15th, 1896.—ABERRATIONS OF EPINEPHELE IANIRA AND LIMENITIS SIBYLLA.—Mr. May exhibited three specimens of *E. ianira*, captured in the New Forest, with large pale blotches on the wings, one specimen being almost entirely pallid; also a specimen of *Limenitis sibylla* ab. *stenotaenia*, captured in the same locality last June. PALLID PATCHES.—Mr. Tutt remarked that these pale patches were due to arrested scale development at an early stage. It had been shown that

the scale in the course of its development in the pupa was (1) Transparent. (2) White. (3) Yellow (owing to the deposit of pigment factor from the pupal blood). (4) Ordinary colour of matured pigment. In the pale specimens under discussion the scales were fully formed, but did not appear to have got beyond stage 2 or 3. *TRIPHENA SUBSEQUA*.—Mr. May exhibited specimens captured in the New Forest in June. Mr. Tutt remarked that the regularity with which this species appeared in the Isle of Wight in September, suggested a regular double brood in the southern counties. **BLACK ABERRATIONS OF *L. SIBYLLA* IN 1896.**—Mr. Heasler read the following note from Mr. Cross, of Ely:—"I have made enquiries about black *L. sibylla*, and can only say I took one; Mr. Nash, two; Mr. Cox, one; Mr. Brannell, two; Geo. Gulliver, ten; and his sister, Mrs. Hillier, several; and also Mr. Hills, of Folkestone, one. How many *C. Gulliver* took I cannot hear, and, I daresay, others that have been here may have taken some; it has been a year for them." **ABERRATION OF *DRYAS PAPHIA*.**—Mr. May said he had seen a specimen of *D. paphia* in the New Forest last June, which had a strong tinge of the *ralesina* coloration on the right hind-wing. **CATOCALA NUPTA AB. CÆRULESCENS.**—Mr. J. H. Smart exhibited a very fine specimen of this rare aberration, which he had bred from a larva taken amongst others, at rest during the daytime on poplars, at Crossness Outfall, Belvedere, Kent, about the middle of June last. It was put into an ordinary breeding-cage, fed on poplar, and pupated at the end of June, the imago emerging on July 18th. Mr. Tutt drew attention to the fact that only two British specimens of this rare aberration were known, one taken by Dr. Laver at Colchester (*Brit. Noct.*, vol. iv., p. 51), and another by Mr. Mark Winkley at Mitcham (*Brit. Noct.*, vol. iv., p. 131). These three specimens all had the usual red colour replaced by a purple-brown tint, and the specimen exhibited by Mr. Smart was also somewhat melanic on the under-surface. **CALOCAMPA VETUSTA VAR. BRUNNEA.**—Dr. Sequeira exhibited Sligo specimens of this particularly Irish form. **ABERRATIONS OF NOCTUÆ CAPTURED AT RAINHAM, ESSEX.**—The Rev. C. R. N. Burrows exhibited a gynandromorphous specimen of *Gonoptera libatrix*, which had been captured at Rainham. The left antenna was distinctly ♂, the right ♀. Also a specimen of *Agrotis segetum*, with the costal edge towards the apex of both fore-wings, quite white in colour. A specimen of *Leucania pallens*, exhibiting aberrant neuration. A specimen of *Mamestra brassicae*, having a ruddy tinge all over the fore-wings. Two female *Agrotis puta*, strongly suffused with red. A specimen of *Tryphaena promuba*, with dark longitudinal lines on the fore-wings. Mr. Tutt remarked, with regard to the red form of *A. puta*, that this was Hübner's type. He had captured a male, richly tinted, at Deal, and recorded the same in *Brit. Noctuae and their Varieties*. **CAPTURES IN SUFFOLK.**—Mr. Bloomfield exhibited *Catocala sponsa*, *Dianthocia cucubali*, etc., from Bures, Suffolk. **FOOD-PLANT OF *PAPILIO MACHAON*.**—Mr. Tutt, referring to a remark made concerning the food-plant of this species in the Alps, said that it was undoubtedly *Daucus carota* and the allied umbellifers, which were exceedingly abundant at pretty high elevations. It occurred up to 8,000 ft., and he referred to a fact, first noticed by Mr. Lemann, that the species had, in the high Alps, a habit of flying about the grassy knolls which surmounted many mountains at a considerable elevation. **SPREAD OF SPECIES.**—Mr. Frost drew attention to the fact that he often

caught an odd specimen of *Dryas paphia* in localities where it did not usually occur, and often somewhat later than is usual in the New Forest, and other localities where it was regularly abundant. He asked whether the members thought it was due to an attempt to spread its area. Mr. Tutt said that he had no doubt there was a tendency in many insects to do this. He had observed both sexes of *Aporia crataegi* at Lautaret, above the tree limit, and where there was no trace of any of their food-plants, unless "Cotoneaster," a food-plant mentioned by Frey and which he did not know, occurred there. He believed the specimens observed at high altitudes, were all stragglers from the lower valleys. EGG OF PAMPHILA COMMA.—Mr. Tutt exhibited eggs of *P. comma* which had been obtained by Mr. Hamm. He stated that the egg had been described by Buckler, but that a description of the larva was a great desideratum. There was considerable uncertainty even as to the food-plant. He also referred to the fact that this species hybernated in the egg stage, and that a description of the egg of *Thymelicus actaeon* was still wanted. ALPINE AGLAIS URTICÆ.—Mr. Tutt also exhibited specimens of *A. urticae*, the larvæ of which had been obtained at Lautaret, where they were abundant, on a patch of stinging nettles, near the Hospice. The larvæ pupated in a large chip box. A very large percentage, however, was infested with dipterous parasites—of two species. The imagines emerged on August 30th, after a journey from Lautaret to London *via* Grenoble. He called attention to the fact that the usual deep red hue of the Alpine specimens was wanting, and that they were very little different on their upper sides from those of southern England, but on the undersides there was a considerable contrast between the pale and dark areas of the fore-wings, the central transverse band was very marked, and the blue spots parallel to the outer margin of the hind-wings were very strongly developed. He also showed the pupa-cases, and drew attention to the mode of dehiscence.

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—August 27th, 1896.—Mr. Montgomery exhibited a beautiful XANTHIC EXAMPLE OF EPINEPHELE TITHONUS, taken at Jevington on July 27th. All the usually black area being of a rich dark fulvous. Mr. Adkin, a flower-head of ivy, with OVA OF CYANIRIS ARGOLUS *in situ*, and made some remarks upon the habits of the species. Mr. Manger, a SPECIMEN OF EUGONIA POLYCHLOROS, taken on May 24th at Brockley. It was suggested that the larva fed on poplar, as no elm was in the neighbourhood. [Had not a May specimen probably hybernated?—ED.]. Mr. Moore, SPECIMENS OF PAPILIO DAUNUS and P. CRESPHONTIS, from St. Augustine's, Florida; also several specimens of the "WALKING STICK," *Anisomorpha buprestoides*, which, when seized, will spurt a strong acid vapour from exceptionally large glands placed in the sides of the thorax. Mr. Mansbridge, a bred SERIES OF POLIA CHI, from a dark female taken near Huddersfield. Several examples were dark, having all the lines, bands and markings of *ab. olivacea*, but without any trace of the olive green shade of that aberration. Mr. South, two SPECIMENS OF CARADRINA AMBIGUA, taken by Mr. Woodforde, near Exmouth, in July this year. The specimens were unusually pale and glossy, no doubt, it was thought, due to its resting habit in that district. In answer to a question from Mr. Barrett, Mr. McArthur said that the LARVA OF HADENA ADUSTA spun its cocoon in the autumn, but did not turn to a pupa till the spring. He had repeatedly found them at the roots of

moss. Mr. Auld reported that the *AB. NIGRATA* OF *LIMENITIS SIBYLLA* had been taken in some numbers in the New Forest this year. He also knew of a specimen of *Polyommatus icarus*, having no vestige of spots on the underside, and a var. of *Dryas paphia*, possessing a pale border and a dark centre being taken. Mr. Turner had taken the SECOND BROOD OF *ZONOSOMA ANNULATA* in N. Kent, and three specimens came to sugar. Mr. Adkin had spent a fortnight at EASTBOURNE, but had seen no *COLIAS EDUSA*. Mr. South's experience was the same. Mr. Mansbridge had heard that the species was to be taken on the east coast. Mr. Tutt, during a month spent in S. France, had seen but half-a-dozen, in fact, it always appeared to be scarcer than *C. hyale* on the Continent. Mr. Tutt asked if there was any direct evidence that *PYRAMEIS CARDUI* HYBERNATED AS AN IMAGO. He had failed to find any authenticated record. In N. Africa, Mr. Eaton had reported the larvæ as feeding during the winter. Mr. Barrett had seen imagines in late autumn, and again in spring, but knew of no positive evidence of the species being found in winter. Mr. Fremlin communicated the following LETTER which he had received:—" 'Culverlands,' 147, Willesden Lane, N.W. Dear Sir,—I can offer bred *X. conspicularis* (Kent) for *P. smaragdaria*. I have them both set and unset, black pins. Can also offer a fine *V. antiopa* (white border). Yours truly, Thos. Humble Ralfe." Strong and pointed criticism of this letter ensued.

NORTH LONDON NATURAL HISTORY SOCIETY.—Aug. 27th, 1896.—Exhibits: *PORHETHRIA DISPAR*.—Mr. C. Nicholson: Series of 1 ♂ and 8 ♀s of *P. dispar*, the ♀s being very handsomely marked, and one of them having the **Λ**-mark and the dot on the fore-wings united. NEURATION.—Mr. Nicholson also exhibited a bred specimen of *Pyrameis cardui*, with the hind-wings much dwarfed and the nervures curiously mixed up; also wings of *Amphipyra tragopogonis*, *A. pyramidea*, *Mania maura* and *Naenia typica*, showing neuration, and explanatory sketch showing the difference between that of *M. maura* and the other three. POLLEN GLANDS ON PROBOSCIS OF BUTTERFLY AND MOTH.—Mr. Battley: *Enodia hyperanthus* and *Noctua xanthographa*, with pollen glands of *Orchis* (*pyramidalis*?) attached to proboscis, from the Warren at Folkestone, July, 1896. ODonESTIS POTATORIA.—Mr. Oldham: Fine bred forms of *Odonestis potatoria*, from Cambridge pupæ. CAPTURES.—Mr. L. J. Tremayne: *Eupithecia subfulvata*, from Leigh, and *Iodis vernaria*, from Westerham. COLLECTING AT SANDOWN.—Mr. Prout wrote from Sandown: "I do not think the Londoners' experience of sugar in early August was really so very different from mine; for, relatively to what one expects, it was also very bad here at that time. It must be borne in mind that *blank nights* are almost or quite unprecedented on the Culver Downs, and that I consider a night when there are only about 50 common moths on the sugar, a wretched failure; and of such nights I have had two or three at least. Even recently, though there is a slight improvement, the numbers present are not large, *Noctua c-nigrum* being much less common than usual, *Triphaena comes* absent, except for one cripple, which came up on two or three nights (usually an abundant species here), *N. xanthographa* quite scarce, *T. pronuba* ditto (two or three per night on the average), the other Tryphænas entirely absent; and even *Agrotis puta* and *Miana bicoloria* hardly so abundant as usual. I ought also to mention that I have only seen two *Peridroma suffusa* and one *P. saucia* as yet. On the other hand, I have a piece of good luck to record in the capture of five

lovely specimens of *Caradrina ambigua*, in three nights; of this species I had previously only taken four—one in 1893, one in 1894, and two in 1895—so that it appears to be gaining ground. *Aporophyla australis* is only just beginning to come out, hence I cannot yet tell whether it will be common or scarce; two perfectly fresh specimens were taken last week. *Polyommatus bellargus*, always common at Ventnor (except only in 1894), is commoner than ever this year, indeed it is in *untold profusion*. It was a sight to see them flying up in clouds from the warm chalk stones, animal droppings, etc., on Boniface Down, last Saturday. I have had two larvæ of *Acherontia atropos* brought me by the coastguardsmen, both taken in the same bit of garden, at intervals of just a week. The first is now in pupa, and the second full fed. I have done very little larva-hunting, as all my available accommodation here is at present occupied by larvæ reared from the egg." **ILL-HEALTH OF MEMBER.**—It being understood that Mr. Quail was shortly to leave England on account of his health, the usual vote of thanks was coupled with congratulations on his recovery from a recent serious illness, and best wishes for his life abroad, and was unanimously carried by the meeting with unusual heartiness. An account was also given by some of the speakers of Mr. Quail's work for the society in the past. Sept. 10th, 1896.—Exhibits: Mr. C. Nicholson: *Noctua dahlii* and *N. rubi*, to exhibit the difference between the species; Mr. Woodward: *Cucullia verbasci* from larvæ taken in the Fens. The Emerald moths, and some of the larvæ, were shown by Messrs. C. Nicholson, Lovis, Harvey and L. J. Tremayne. Mr. Harvey recorded *Epione apiciaria* and *Cidaria testata*, from Epping Forest, the previous Saturday. Mr. Harvey opened a discussion on THE EMERALD MOTHS. He gave a short life-history of each species, and said it was a remarkable thing that nearly all the larvæ, though hatching so early in the autumn, go through the winter in a very small state, and do most of their feeding afterwards. Mr. C. Nicholson suggested the possibility of a second brood of *Iodis lactearia*. Mr. Quail referred to the discovery of a pink variety of *Metrocampa margaritaria* on the Continent. Mr. L. J. Tremayne enquired as to the likelihood of the extermination of *Phorodesma smaragdaria* in its present restricted haunts, and if any special means had yet been discovered of preserving the delicate colour of these beautiful moths. Mr. Simes referred to the discovery of *Phorodesma smaragdaria* by Mr. Tutt, in the high Alps, a find which Mr. Harvey subsequently characterised as very curious, considering the location of the insect here.

REVIEWS AND NOTICES OF BOOKS.

ABSTRACT OF PROCEEDINGS OF THE SOUTH LONDON ENTOMOLOGICAL NATURAL HISTORY SOCIETY, 1895. [Published at the Society's rooms, Hibernia Chambers, London Bridge, S.E. Price 2/-].—Thanks to the energy of the secretaries, these *Proceedings* are now brought well up to date. The present volume is of considerable scientific value, both for the short notes and observations relating to numberless species of various orders, and the longer papers it contains. An excellent summary of the Society's work during 1895 forms the presidential address for the year. "Notes on Sea Anemones," by Edward Step, F.L.S. "*Colias edusa*, 1895," by E. M. Montgomery, and "The variation of *Erebia aethiops*," by J. W. Tutt, F.E.S., are the titles of the more ambitious papers.

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On the hibernation of certain British Butterflies in the imago state.

By J. W. TUTT, F.E.S.

One would have supposed that, as butterflies are such delicate creatures, and pass a certain period of their lives in a quiescent state, the pupal, Nature would have selected this for them to pass the winter, and one is, therefore, much struck with the fact that Nature, showing her usual abhorrence of fixed rules, does nothing of the kind, but selects, as it were, each of the four stages—ovum, larva, pupa and imago—through which a butterfly passes, for different species to hibernate, and we find that, whilst many *Theclidi* pass the winter as eggs, the *Vanessidi* as imagines, and the *Pieridi* as pupæ, yet a great proportion of our British butterflies hibernate in the larval state.

One would assume, even then, that closely allied species would hibernate in a similar manner, and to a great extent this is true. The whole of the British Hesperids hibernate as larvæ, except *Syrichthus malrac*, which hibernates as a pupa.* All the British Lycenids hibernate as larvæ, except *Plebeius aegon* and *Lampides boetica*, which hibernate as eggs, and *Nomiades semiargus* and *Cyaniris argiolus*, which hibernate as pupæ. Again, the British Theclids hibernate in the egg state, except *Callophrys rubi*, which hibernates as a pupa. The British Pierinæ hibernate as pupæ, except *Aporia crataegi*, *Colias hyale* and *C. edusa*, which hibernate as larvæ, and *Gonepteryx rhamni*, which hibernates as an imago. All the British Argynnidæ (and Melitæids) hibernate as young larvæ, except *Argynnis adippe*, which hibernates as an egg (although the larva is coiled up within the egg all the winter). All the Vanessids hibernate in the imago state, except *Pyrameis cardui*, which probably never hibernates in the true sense of the word at all. The Satyrids all hibernate as young larvæ without exception, unless *Pararge egeria* be admitted as such. There is then, in our British fauna, variety enough among near allies in their hibernating stages, and yet a great deal of similarity between them, taken as a whole. Nor is this confined to Britain (or Europe), for the Vanessids, which are spread over the temperate regions of the Old and New Worlds, where the winter is very pronounced, pass the winter on both Continents in the imago state. This is not difficult to understand, for most of the Vanessids disclose their imagines at a late period of the year, and would not have time to complete their transformations before winter would overtake them. Yet, in hot seasons, both *Vanessa io* and *Pyrameis atalanta* do, more or less successfully, get in another partial

* *Thymelicus lineola* and *Pamphila comma* hibernate as eggs.

brood, although it often happens that the progeny of those that attempt it is exterminated, and Nature is careful that in every brood, however hot the summer, a certain percentage shall hibernate. So fixed is this habit that there are often three broods of *Polygonia c-album* and *Aglaia urticae* in a year, yet a part of each of these broods goes at once into hibernation (the first often as early as June). *Pyraus cardui*, which, probably, cannot hibernate in the imago state in Britain, is killed off after each of its immigrations.

Scudder records that "in some instances, some of the chrysalids which should produce the autumn brood, do not give out the butterfly until the following spring." We have never heard and cannot believe that this is the case in a state of nature for any of the butterflies that naturally hibernate in the imago state. Scudder further says that, "According to Wiesenhütter, such chrysalids of *Euranessa antiopa* as pass the winter are presumably females, inasmuch as the female, according to his observation, is generally fresh-coloured in the spring, whereas the males are always very much battered and worn." We are astonished at Scudder quoting such an illogical paragraph, and if the only reason that Wiesenhütter had for assuming that some chrysalides of *E. antiopa* went over the winter, was the fresh appearance of some of the females in the spring, we should beg leave to doubt the fact that in nature *E. antiopa* ever passed the winter in the pupal stage. We do not think it possible.

It is pretty certain that, in the case of all these wintering butterflies, pairing always takes place in the spring, and we believe that, in all cases where precocious specimens pair before hibernating, the female lays her eggs, attempts to rear another brood, and dies, the progeny usually being exterminated.

Very little is known as to where butterflies hibernate. The marvellous resemblance of *Gonepteryx rhamni* to a dead leaf suggests that it hibernates among the leaves upon the ground. Landois saw *Vanessa io* take up its winter quarters in an ivy bush, hanging from a branch, and remain unmoved until a spell of warm weather in early spring caused it to disappear. Goossens, of Paris, records having twice brought down *Polygonia c-album*, when beating small trees in November, and on these he made some interesting observations, bringing them home and placing one in an unwarmed apartment, and the other in the open air on the north-east side of a window. They did not stir until February, when they resumed their activity. "The one in the open air had experienced a temperature of at least $-5^{\circ}\text{C}.$, and Goossens discovered that numbness only comes on at $-2^{\circ}\text{C}.$, for when it was warmer their position showed that they appreciated the difference between day and night. At such a time the hind-wings are kept motionless, but in the day time the fore-wings are advanced, so that the inner margin is at right angles to the body; at dusk, the fore-wings creep backward and finally pass behind the hind-wings, nearly filling the empty space between the two wings in this genus, due to their great excision. The process is again reversed in the morning, showing that the butterflies are not completely benumbed, and, however quiet, recognise the distinction between night and day."

Scudder gives an observation of his own, which he made on a specimen of *Euranessa antiopa*, which, one November day, flew into his cellar, "and took up its position on one of the risers of the stairway,

just beneath the projecting edge of the tread above, the extremity of its wings projecting beyond the tread. Here it remained for three months without moving, except that it shifted its position six or eight times in the course of the winter, sometimes forward, sometimes backward, within the range of about an inch. At first the plane of the closed wings was perfectly horizontal, but about the middle of January they became slightly oblique, and the morning of the day it left its station the obliquity was somewhat increased. It was watched daily the winter through, and the wings were always in the attitude taken at complete repose in the summer. When, on the last day of February, it left its station, it took up another, head downward, on the cellar wall, near a window where it caught the sun's rays a part of the day, and here it remained motionless for five days more, except for slight shifts as before, and that when the sun struck it, its antennæ were thrust forward and parted a little, instead of being ensconced beneath the wings."

Of the hybernation of *Aglaia urticae*, the Rev. O. Pickard-Cambridge, gives an account (*Entom.*, iii., p. 299) of a specimen which entered the parish church of Winterbourne-Tomson, towards the end of August, settled on a projecting rafter, and remained there throughout the autumn and winter, "evidently never having once moved from its first position," until May 5th the following year, when it came off its perch and flew briskly about the church. "Its period of motionless repose had thus been just nine months, and it was apparently as fresh in colour and condition as if just out of the chrysalis."

There is no doubt that each species has its own peculiar hiding places—clefts of rocks, hollow trunks of trees, in stacked wood, barns, church steeples, etc. Probably the two first-mentioned are the commonest in nature, and some species, perhaps, simply hang beneath the branches of trees. Scudder says, "Woodmen sometimes, in cleaving open a tree, will discover a little colony of hibernating butterflies, as has been done in the case of *Anosia archippus*." As we are much inclined to doubt the natural hybernation of this species in the imago state, we should be interested in any further records of the habit in this species. Newman (*British Butterflies*, p. 17) states that he once found more than forty specimens of *Vanessa io* hibernating inside a hollow oak.

We have previously noticed Scudder's (Weisenhütter's) remarks about the hybernation of *Eurænassa antiopa*, but his exactly parallel views of the hybernation of *Pyrameis cardui* and other species in North America are most remarkable. Of *P. cardui* he writes:—"It hibernates in the butterfly state (perhaps also some autumn chrysalids pass over the winter), and so appears in early spring" (*The Butterflies of the Northern United States and Canada*, p. 85). We should require much evidence of a very exact nature before we could suppose this possible, but Scudder seems to think it the most natural thing possible that butterflies should hibernate in this haphazard fashion, for he says of its near ally, *P. huntera*:—"It is double-brooded in the north, hibernating as a butterfly, and also to some extent as a chrysalis.*" The

* These remarks show that Scudder does not mean to suggest that the two different methods of hybernation are adopted at different latitudes, but that both occur in the same latitude.

hibernating butterflies leave their winter quarters about the middle of May, and the chrysalids give forth their contents a few weeks later. . . In the South the number of broods is certainly greater, and the winter is passed in the butterfly state,* if not also in the chrysalis" (*Ibid*, p. 87). He makes an almost identical statement about *P. atalanta*, of which he writes:—"Its life-history is much like that of *P. huntera*, it being double-brooded, and hibernating principally as a butterfly, but also as a chrysalis. About the second week in May, the butterfly comes out of winter quarters, and by the first week in June the chrysalids begin to disclose their inmates, both sets of butterflies laying eggs at or about the same time" (*Ibid*, p. 88). Of *Aglais milberti* we read:—"It is triple-brooded, hibernating in both the butterfly and the chrysalis state, in the former, under piled stones. The wintering butterflies come out while the snow lies on the ground, and in April the wintering chrysalids give birth to the enclosed butterflies, which may be found on the wing in May" (*Ibid*, p. 90). That the above records are a series of errors based on insufficient data, we strongly suspect, and unless Mr. Scudder will assure us that he has himself seen the pupæ of *P. cardui*, *P. huntera*, *P. atalanta* and *Aglais milberti* in a state of nature during the winter months, we shall await, with some degree of certainty, the correction of the above data by some observant North American entomologist, so completely are they opposed to the regularity with which the butterflies of temperate regions ordinarily pass the winter in the same stage.

It is remarkable that almost all the butterflies that hibernate in the imago state belong to the *Vanessidi* and *Rhodoceridi*, but it is so; the hibernating American *Callidryas eubule* and *Xanthidia nicippe* being allied to our *Gonepteryx rhamni*, whilst the American *Vanessids* have identical habits with their European allies.

* These remarks show that Scudder does not mean to suggest that the two different methods of hibernation are adopted at different latitudes, but that both occur in the same latitude.

Are British Butterflies over collected?

By W. J. KAYE, F.E.S.

It is with intense satisfaction that I see this subject brought forward by the Entomological Society of London, and also by the *Record*, in the latter June number of this year. Are British butterflies over collected?—and this query applies to moths as well—Yes! emphatically yes!!! Who has not been to Wicken, to Chatenden, to Barnwell Wold, to the Cotswolds, to the Isle of Wight, and not seen the result and the cause of such? How is it to be put a stop to? Capt. Elwes is quite right in saying that schoolboys do *not* destroy many (if any, I should like to add) species. They get tired of catching the same insect, and consequently direct their thoughts to something fresh. Neither do dealers, *per se*, exterminate species. They have not got the time! "It is the man who simply collects" who is at the bottom of the trouble. This "mighty atom" catches all he can of the rare insects that occur in his neighbourhood, and if this is done yearly, how can the insect exist after many years? Clearly, then, we have to cope with this being. And as it is difficult to cope directly, indirect means must be applied. These "collectors" do not collect for the love of

the thing, or from any scientific motives. It is so that they can catch those entomologists who have more money than brains, and who want a big series of the rare species. If anyone wants a long series of a scarce insect, let him box a female and rear a series. He will learn twenty times more about the insect than by taking the series of imagines, and ten thousand times more than by buying. Or again, collect a big series over several years. Or if you must buy, buy from a well-known reliable collection, when put up to auction at Stevens', for instance; but do not buy rare insects from dealers, and more especially from those exterminators who supply the dealers, and anyone else, should they offer to purchase. If all the societies in the country were to proclaim this to their members, who could in turn tell their friends who do not aspire to belonging to a society, I think we should be on the high road to rectifying a growing evil, which, if not taken in hand, will very soon assume such alarming proportions, that the interest in entomology, as far as these islands are concerned, will be seriously curtailed to all those who collect as a means to an end, and which end is not extinction.

MIMICRY.

VI.—SELECTION GUIDED BY UTILITY AT WORK.

By J. W. TUTT, F.E.S.

We have already seen how the variational units of an insect's wing may differ. The variational unit may consist of a whole wing, of the surface of a wing, of any part of the wing or of a single scale, and we have seen that whilst the variational units result from internal forces, their ultimate course, size and shape, is decided by utility.

It may be well now to follow Weismann's course of reasoning, through what he conceives to be the *modus operandi* by which a hypothetical butterfly reaches a certain pattern of mimetic coloration.

"Let us suppose," he says, "that the ancestral species of a certain forest butterfly habitually reposed on branches near the ground, and covered with dry or rotten leaves; such a species will have assumed on its under surface a protective colouring which by its dark, brown, yellow, or red tints will tend towards a similarity with such leaves. If, however, the descendants of this species should be subsequently compelled, no matter from what cause, to adopt the habit of resting higher up, on the green-leaved branches, then, from that period on, the brown colouring would act less protectively than the shades verging towards green; and a process of selection will have set in which consisted first in giving preference only to such individuals whose brown and yellow tints showed a tendency to green."

Development in the direction of an increase of green colour, Weismann points out, is only possible on the assumption that the biophors composing the determinants of the scales affected could alter in quantitative proportions, so as to increase the green and decrease the number of brown scales. When the determinants which give rise to green, however, once begin to prevail, "the selective process must continue until the highest degree of faithfulness required by the species in the imitation of fresh leaves has been attained."

"That the foregoing process has actually taken place is evidenced, not only by the presence of the beginnings of such transformations, as

found for example in some greenish-tinted specimens of *Kallima*, but mainly by certain species of the South American genus *Catonephele*, all of which are forest-butterflies, and which, with many species having dark brown under surfaces, present some also with bright green under surfaces—a green that is not like the fresh green of our beech and oak trees, but resembles the bright under surface of the cherry-laurel leaf, and is the colour of the under surfaces of the thick leathery leaves, coloured dark green above, borne by many trees in the tropics.”

The essential difference between the selection process, as explained by Weismann, and the old theory is this:—That under the old conception variations were fortuitous, and that selection had to wait for these chance favourable variations before it could commence its work. Under the new conception every portion of the organism contains in its initial stages an indefinite number of variations within itself, some of which are almost sure to be in the direction required. Selection chooses those she requires, and by the process of intra-selection compels them, as it were, to overcome their competitors, and utilises them to produce those results which will be of service to the organism.

“This is the only way,” Weismann says, “in which I can see a possibility of explaining the phenomena of mimicry—the imitation of one species by another. The useful variations must be produced in the germ itself by internal selection-processes if this class of facts is to be rendered intelligible. I refer to the mimicry of an exempt species by two or three other species, or, the aping of *different* exempt patterns by *one* species in need of protection.”

It has until recently been considered that some degree of similarity between the copy and the imitation was present from the start, but Dr. Dixey has recently shown* that even this is not at all necessary. Weismann considers that the minute similarity in the design which exists between the mimic and the mimicked, would have been impossible if the process of adaptation had depended entirely upon personal (individual) selection. Were this so, a complete scale of the most varied shades of colour must have been continuously presented as variations in every species, which certainly is not the case.

“For example, when the exempt species *Acraea egina*, whose coloration is a brick-red, a colour common only in the genus *Acraea*, is mimicked by two other butterflies, a *Papilio* and a *Pseudacraea*, so deceptively, that not only the cut of the wings and the pattern of their markings, but also that precise shade of brick-red, which is scarcely ever met with in diurnal butterflies, are produced, assuredly such a result cannot rest on accidental, but must be the outcome of a definitely directed, variation, produced by utility. We cannot assume that such a coloration has appeared as an *accidental* variation in just and in only these two species, which fly together with the *Acraea* in the same localities of the same country, and the same part of the world—the Gold Coast of Africa. It is conceivable, indeed, that non-directed variation should have accidentally produced this brick-red in *a single case*, but that it should have done so three times and in three species which live together, but are otherwise not related, is a far more violent and improbable assumption than that of a casual connection of this coincidence. Now, hundreds of cases of such mimicry exist in which the colour-tints of the copy are met with again in more or less

* “On the relation of mimetic patterns to the original.”—*Trans. Ent. Soc. Lond.*, 1896, pp. 65-81.

precise, and sometimes in exceedingly exact imitations, and there are thousands of cases in which the colour-tint of a bark, of a definite leaf, of a definite blossom, is repeated *exactly* in the protectively coloured insect. In such cases there can be no question of accident, but *the variations presented to individual selection must themselves have been produced by the principle of the survival of the fit!* And this is effected, as I am inclined to believe, through such profound processes of selection in the interior of the germ-plasm."

Thus far Weismann has at present advanced the study of the principles by means of which the mimicry of insects has been brought about. In this manner he explains Bates' statement that "on the wings, Nature writes as on a tablet the story of the modification of species, so truly do changes of the organisation register themselves thereon." Probably, in this country at least, no one knows less of the general principles underlying the markings, coloration, and patterns of insects' wings than many of those who style themselves entomologists. Such will regret that so much has been written without adding a new species to the British list. We have not, like Weismann, to ask "the hotspurs of biology" to restrain their ardour, and to remember that "all our knowledge is, and remains throughout, provisional," we have, on the other hand, to beg that our readers will bear with us in asking them to fairly look at Weismann's position, and to assure them that this is only the beginning of the end. We can promise them that, if they have once interested themselves in the more intellectual branches of entomology, they will have added a very great additional source to the sum total of the pleasure that it is possible for them, as educated men, to get out of existence.

SCIENTIFIC NOTES AND OBSERVATIONS.

PARASITES ON THE PUPE OF *APAMEA OPHIOGRAMMA*.—I have identified the parasite you sent me from pupæ of *A. ophiogramma* as *Phygadeuon abdominalis*.—T. R. BILLUPS, F.E.S., 20, Coplestone Road, Peckham, S.E.

NOMINA NUDA.—It is certain that in the literature of the Lepidoptera one matter will prevent uniformity in nomenclature, unless it is settled in a reasonable way. It relates to the validity of what are called "bare" generic names. Schrank's names, and some others now in use, are "bare" names, in so far as they were originally published without definition. The "Tentamen" names are in like case. Some twenty years ago, in studying the subject, I came to the conclusion, since adopted by me in my writings, that a "bare" name was strictly speaking one which could not be identified or applied in any way; as a species name it is one without a description or a reference, and as a generic title it must be in the same case. But a generic title, proposed for certain species cited by name as described, cannot fall into this category, because it gives a reference to facts already known to science. I formulated the rule in this way. *The sole test for the applicability of the name rests with the possibility of its identification from what is published about it.* Thus a name published by a figure alone is clearly valid. A generic name published with a known species included under it is valid, and so are catalogue names for genera. We know in every case what is meant, and this is sufficient. A little

reflection will show the reasonableness of this. There is no test of how much or how little of a description is necessary. Most generic diagnoses are insufficient, many incorrect. Each generic title must have its type, a type which shows the points of structure the generic title covers or indicates. Genera without types are of no value to the student, he cannot refer to any structure to verify the diagnosis. Large genera without a type are in a metaphysical condition. They are supposed to rest on "average characters," but no one species has precisely these "average characters." Each species, as represented by individuals of either sex, offers characters specific, generic, and also such as indicate its position in a certain sub-family, family, or super-family. The one principle recognised in nomenclature is priority of publication, and all rules are concerned to show how, under the different circumstances attending the existence of names, this principle is to be applied. The name belongs to literature, and is subject to literary regulations.—(PROF.) A. RADCLIFFE GROTE, M.A.

THE HABITS OF *PORTHETRIA DISPAR*.—During a recent entomological trip to the Dauphiné Alps, I made some (to me) interesting observations on the habits of *P. dispar*. To break my journey I made a two days' (July 25th and 26th) stay at Aix-les-Bains, and visited the woods on the hills between Grésy-sur-Aix and the Lac du Bourget, a locality previously described in this magazine (vol. vi., pp. 169-172). One of the first insects that attracted my attention was *P. dispar*, the males of which were flying rapidly about, in the broiling sunshine, in much the same way as do those of *Orgyia antiqua* in Britain. They were in thousands, both in the lanes and in the woods, but I observed no females, the lack of large trees enabling them to hide successfully. On August 18th I was at Bourg d'Aru (about 3,500 ft. elevation), in the lovely Val de Vénéon. Near the village I again saw the males in large numbers, flying in the sunshine, and settling the moment it became cloudy. These haunted the faces of the massive rocks that rise from the path, and I was not long in detecting the females, seated upon the bare rock, from which they fell helplessly when disturbed with a stick. Here, too, some males were resting, sitting much in the same manner as those of *O. antiqua* sometimes do, upon a window or wall. This race, both males and females, was small, although there was some variation in size; but on the whole the specimens bore much the same appearance as do those with which we are familiar in Britain as the result of persistent in-breeding. There appeared to be little doubt that the females had emerged from pupæ whose cocoons were hidden in the crevices of the rock, and that the males haunted the rocks because the females were there. The days of August 20th and 21st were spent at Grenoble. Both days were continuously wet and dull, and entomological observations were at a discount. Strolling, however, under an avenue of plane trees, by the banks of the Isère, I was soon aware that the trunks were plentifully sprinkled with the females of *P. dispar*. My curiosity awakened, I discovered that all the trees forming the avenues in the town itself, as well as those in the public gardens, were similarly tenanted. They were not difficult to detect, yet they were certainly not conspicuous to the uninitiated. The moths exhibited no very marked preference for any particular kind of tree on which to rest, except perhaps in the case of the plane tree (the most common, by the way), all other kinds having tenants. They congregated

chiefly at from 10 to 15 feet from the ground, at those points of the tree-trunks from which the larger branches spring, but many were within reach, and some were at the very bottom of the trunks. The moths were of large size, many quite as large as the largest of those which we, in Britain, designate colloquially, the "old Fen form." Of those found near the bottom of the trunks, say within 2 or 3 ft. of the ground, every female, without exception, was crippled. I observed some 50 specimens thus crippled in one avenue of about 100 yards. Those that I dislodged from the higher parts of the trunk, with the aid of a stick, had usually well-developed wings, but they were quite disinclined to use them, by day at least, as organs of flight. One could not help being struck with the degeneracy of the wing development, not so much in mere wing-expanse, which was very considerable, but in the crumpled and crippled condition of the organs in such a large percentage of specimens. I observed no males at Grenoble, except two with crippled wings, resting on the tree-trunks. To carry some of the specimens to the hotel, I deposited a dozen in the top of an ordinary round felt hat, and wore it for an hour or two without disturbing the occupants, which never stirred from the positions in which they were placed. Three others I carried on a small piece of bark, just large enough to allow them to cling to and for me to hold, but although the rain collected on their wings, and might readily have disturbed them, they did not move, nor did they during the five or six hours following, when they were placed on a table. So far my observations had led me to notice a great resemblance between this species and *Orygia*.

My next observation, however, was of a different character. Scattered over the tree-trunks, on which the females were resting, were their egg patches. These could be seen on all parts of the trunks, from the base upwards. They varied in size, from patches two inches long by one inch broad, to patches of less than half these measurements. They were chiefly oval in shape, and the eggs were snugly encased in a large quantity of the dark fluffy scale material, which evidently comes from the anal tuft, as in the case of *Porthesia*. In fact, the whole habit and mode of egg-laying suggest as close an alliance with the latter genus as do the habits of the imagines with *Orygia*.

There is only one more fact to add. An intelligent French workman, who saw me depositing the females in my hat, ventured the observation that the caterpillars stripped the trees early in the year, but that the trees did not appear to suffer from their depredations, as the foliage soon grew again, and certainly the foliage showed no signs of the serious onslaughts that must have been committed a few weeks previously by the army of larvæ which had resulted in producing the large number of *P. dispar* that I did see, as well as that probably much larger number that I did not see.—J. W. TUTT.

BOMBYX QUERCUS AND B. CALLUNÆ.—Capt. Thompson, in his "Notes on the deviations in the life-histories of *Bombyx quercus* and *B. callunæ*," states, *ante*, p. 127, that "in Yorkshire the type occurs only on the coast." This is an error, as I have specimens of undoubted *B. quercus*, from Beverley, bred by myself from larvæ, and it also occurs at York and Rotherham. With regard to the date of appearance for *B. callunæ*, last year I bred some 97 specimens, these emerged from the 5th to the 29th of June. As to the time of emergence, I

found the majority emerged about noon. I have never, or, rather, do not now experience any difficulty in separating the type from the variety. The following notes as to the number of eggs laid by *B. callunae* may be of interest: 121, 204, 226, 227, 122, total for five moths, 900 eggs, or an average of 180 eggs each. As to duration in the egg state, eggs laid on June 17th hatched on July 13th and 14th, and eggs laid June 20th, hatched July 15th and 16th. *B. callunae* frequently remains two years in the cocoon. In the *Entomologist's Record*, vol. v., p. 198, is a note from Mr. Alfred F. Johnson, Erdington, on the "copulation" of two male *B. quercus*; it may interest Mr. Johnson, and others, to know that on June 17th last, whilst "assembling" with the females of *B. callunae*, the males were so eager to copulate that two male *B. callunae* copulated together on two different occasions during the day, and it required the exercise of considerable force to pull them asunder, and a male copulated with a female whilst held between the fore-finger and thumb. The females commence to "call" about noon, and continue to attract until 3 p.m. The males always come up against the wind. The females do not exercise any choice in the selection of their partners.—WILLIAM HEWETT, 12, Howard Street, York. September 17th, 1896.

NOTES ON LIFE-HISTORIES, LARVÆ, &c.

Description of the full-grown Larva of *Amphidasys strataria* (prodromaria), with some notes on its Protective Coloration.

By J. W. TUTT, F.E.S.

Early in May, Mr. Garland sent me larvæ of *A. strataria* (*prodromaria*), with the intimation that there was not a description of it extant in any of the generally used books. As these usually consist only of Newman's *British Moths* and Stainton's *Manual*, both, of course, woefully out of date, I was somewhat sceptical, and suggested that it was probable that more than one description of the larva might be found in our magazines and more recent works. I only make these preliminary remarks to excuse myself for doing again, what has possibly been done much better, several times before.

DESCRIPTION OF LARVA.—Head.—The face flat, bright red-brown in colour, the clypeus well-marked as a triangular shield, with a small black angle (Λ) at apex; the whole face covered with brown and white warts, giving it a scabrous appearance; the crown of the head with median furrow, giving a horned appearance to each side; the cheeks duller brown than the face, thickly warted with brown; the ocelli black, remarkably bead-like in appearance, of varying sizes (under a one-sixth lens). Head somewhat retractile within the prothorax.

Skin.—The skin appears to be of a dark, dirty-brown colour, to the naked eye, but under a one-sixth lens is pale greyish, with a tinge of green, and marvellously covered with remarkable little spherical warts of two distinct kinds:—(1) Black. (2) White. The skin of the thoracic segments is very much wrinkled, and presents a great difference in appearance when compared with the less wrinkled skin of the abdominal segments, the latter, except at the incisions, where they are wrinkled, being fairly well filled out. The use of the wrinkled thoracic skin is evidently to give the larva greater reaching power, an important factor in its existence.

Thorax.—The *prothorax* is broader than the head, with two reddish-brown warty (apparently corneous) projections behind the two horned structures of the head, which are brought up close to the latter when the head is retracted, but seem to be at some distance from it when the larva is stretching. There appear to be five ill-defined subsegments; a medio-dorsal furrow on the 1st subsegment is not continued backwards. The prothoracic spiracle is very distinct, and under a one-sixth lens looks like a deeply excavated flesh-coloured basin, with a shiny black rim. The skin is well sprinkled with black rounded warts, and rather larger but similarly rounded white warts, following the subsegments transversely. Certain black warts appear to be provided with tiny black bristles, but I could not satisfy myself that these were analogous with the ordinary tubercles. A collection of whitish warts below, and another in front of the spiracle, suggest the sub- and pre-spiracular tubercles respectively. The *mesothorax* is about as wide as the prothorax, apparently with six subsegments, but these are difficult to make out, owing to the skin being so wrinkled. The *metathorax* almost as wide as the two preceding segments, apparently also with 6 subsegments, and the skin also very much wrinkled. The *true legs* have the hooks bent forward. The legs are pale brown in colour, with whitish joints; pale brown but strong hooks, with which it climbs rapidly up the abundant, thick, flossy silk that it spins.

Abdomen.—The 1st abdominal segment is narrower (transversely) than the thoracic segments, but about the same length (from front to back), and the skin is scarcely as wrinkled. The 2nd abdominal is much longer (from front to back) and less wrinkled, whilst the 3rd abdominal increases slightly in width. The 4th abdominal is still wider, and has a small lateral projecting wart on each side, whilst the 5th abdominal is the largest of all the segments, and has a large projecting wart on each side. This segment (5th) is the most modified of all, because it is the one nearest to the branch on which the larva rests, but with which it does not actually lay hold. The 6th abdominal carries large fleshy prolegs, but is narrower, both dorsally and laterally, than the 5th. The 7th is more nearly of the width of the 6th, but it bears no prolegs. The 8th abdominal is provided with two small lateral tubercles, joined by a transverse ridge across the dorsum of the segment. The 9th and 10th segments are hardly distinguishable from each other; the former appears to carry the two large well-developed anal prolegs, between which is a highly specialised and well-developed anal flap. The anal prolegs form a well-developed arch, and exhibit tremendous clinging power.

Abdominal markings.—On the 1st, 2nd, 3rd, 4th, 5th, 6th, 7th and 8th abdominal segments are lateral oblique ridges, commencing in a wart on the anterior subsegment in the subdorsal area of each segment, and continued downwards and backwards to the posterior subsegment, ending in a tumid latero-ventral flange, which is broken at the segmental incisions. The warts on the 4th and 5th abdominal segments are large and prominent, especially those on the latter, where their rather paler reddish-grey colour makes them bear a close resemblance to the excrescences on an oak twig. On the 1st subsegment of each segment is a pair of small whitish dorsal dots, representing, apparently, the anterior trapezoidals. The subdorsal warts appear to represent the posterior trapezoidals. The position of the

prolegs is occupied on the 2nd abdominal by a whitish spot, those on the 3rd, 4th and 5th abdominal by brownish plates, surrounded by a pale yellowish-grey patch. The ventral area between the two pairs of prolegs whitish.

Colour variation.—The colour of the younger larvæ is pretty constant, and varies little. It is of a dull brown hue, with the lateral warts paler brownish, and the pale anterior trapezoidals (?) and four points on the dorsum of the 7th abdominal segment whitish or yellowish. When full-grown, however, there is considerable variation. Then some individuals have a distinctly grey prothorax, whilst the segmental incisions (for a distance extending over the two posterior subsegments of each segment, and forming a row of somewhat quadrate medio-dorsal grey blotches) are similarly coloured. These blotches are darker centrally and in front, and extend over the posterior half of each segment, and are terminated by the two pale anterior trapezoidals on the succeeding segments. In the palest specimens, the 5th abdominal and two following segments are almost entirely grey dorsally.

It is noticeable (under a one-sixth lens) that the pale tubercular spots are composed of a number of whitish warts, but the grey patches on the pale specimens, just described, are really due to the skin being of a different hue, and not to the presence of pale warts. There can be no doubt, I believe, from my observations of the larvæ, and the fact that they are somewhat polyphagous (on trees, at least), that this pale form of variation has been evolved to protect the larvæ on trees with pale-coloured twigs such as birch, the darker ones being better protected on oak. I am under the impression that every brood will give examples of each form—*i.e.*, the dark and pale forms—and that, whilst under one environment, the pale will be better protected, under another environment the darker will be so. At any rate, both forms were produced, with me, from a small brood, the individuals of which were kept under exactly identical conditions.

Variation in time of feeding up.—It may be well to remark that, whereas some specimens fed up very rapidly, and had reached maturity by the first week of June, *i.e.*, in about four weeks, others were then not more than an inch long, and are now (July 1st) not more than half-grown. I do not suppose that these will be full-fed for at least another three weeks yet.

THE NEWLY-HATCHED LARVA OF *HADENA DISSIMILIS*.—To the naked eye the newly-hatched larva of *H. dissimilis* appears to be of a dark purplish colour, corresponding almost with the final colour of the egg. This is due, perhaps, to the closeness of the tubercles. It suspends itself by a thread, or lets itself down to the ground, and coils up when disturbed.

Twenty-four hours after hatching it is about treble its size when hatched, and is now distinctly green in colour, with black warts. The head is pale brown, and bears a number of black tubercular warts, which appear to bear some analogy in position to those on the body segments. Like the latter, each tubercle bears a single black hair. The ocelli are minute, and form a lunule of close black spots, not very different in appearance from the ordinary tuberculated warts, but much more oval and without hairs. The crown of the head is depressed centrally.

The PROTHORAX is very different in its armature from the meso- and meta-thorax. The anterior and posterior trapezoidals are placed directly behind each other in two pairs, one pair on either side of the median line. A well-developed lateral tubercle on each side of these is evidently the supra-spiracular, whilst there are well-developed pre- and sub-spiracular tubercles. The spiracle itself is placed well back towards the segmental incision, and is larger than the abdominal spiracles. The MESO-THORAX and META-THORAX are very similar in their structure and armature. They are narrow, and the tubercles are crowded into a single transverse row, five on each side of the middle of the dorsum. These represent in order, judging from the analogies of the tubercles of the pro-thorax, the anterior trapezoidal, the posterior trapezoidal, the supra-spiracular, the pre-spiracular and the sub-spiracular tubercles. Of these, the pair nearest the median line of the dorsum (*i.e.*, the anterior trapezoidals) are very small, the posterior trapezoidals well-developed. Below the sub-spiracular tubercles is a slightly tumid longitudinal ridge, below which, on each of the thoracic segments, is a marginal tubercle just above the legs, and another in front and another behind the base of each leg. The legs are greyish, with a single terminal claw, and a few grey hairs at each joint; a black ring surrounds the leg where it joins the body.

From the 1st to the 8th abdominal segment the tubercles are arranged in typical fashion, *viz.*, the anterior trapezoidals on the 2nd (?) subsegment, placed somewhat closer together than the posterior trapezoidals on the 4th (?) subsegment. These make up the dorsal series, whilst the lateral series consists of a supra-spiracular tubercle, a post-spiracular tubercle and a sub-spiracular tubercle. It will be observed that on the abdominal segments there is a post-spiracular and no pre-spiracular tubercle, whilst on the thoracic segments there is a pre-spiracular and no post-spiracular tubercle. On the 9th abdominal segment the tubercles are crowded, and the trapezoidals lose the definite positions of the preceding segments, whilst on the anal segment the hairs of the tubercles form a sort of marginal fringe, the tubercles being placed on the lateral edges of the flap. On all the segments the tubercles are simple raised warts, and bear a single black hair. The colour of the 8th, 9th and 10th abdominal segments is yellowish rather than green.

The larvæ loop very distinctly. They possess, when newly-hatched, anal prolegs, and a pair of prolegs each on the 5th and 6th abdominal segments. Those on the 3rd and 4th abdominal segments are traceable (with a one-sixth lens), but are totally useless for walking purposes. At rest, the larva is extended, but when startled, draws itself up, Geometer-fashion, into a hook before dropping by a silken thread. (Larvæ hatched 29th June, 1896. Described 30th June, 1896).—J. W. TUTT.

EGG OF ENODIA HYPERANTHUS.—Unattached. Surface very finely ribbed, shiny, pale yellow in colour; a deep depression at the broad end, which is somewhat flattened; the remainder of the egg forms about $\frac{3}{4}$ of a sphere. Edge of summit pitted with concentric rings of polygonal cells, which are continued down the sides, the micropylar cells forming a rosette of very minute cells, but with scarcely any trace of a special micropylar depression. A bright yellow patch near apex of egg, with two or three brown spots, the remainder of egg pearly

yellow (bright yellow area = ? head of larva). Just before hatching, the egg becomes more orange, and shows a number of fine reddish streaks.

EGG OF *EPINEPHELE IANIRA*.—In shape a truncated cone, with deep micropylar area; about 24 well-developed longitudinal ribs running from apex to base becoming evanescent where attached to grass leaf; a large number of faint circular ridges run transversely between the longitudinal ridges; the longitudinal ridges pass over summit into micropylar depression. There is a series of irregular red-brown patches scattered over surface and in micropylar depression; these blotches are variable in size. Transverse markings between longitudinal ridges somewhat ladder-like. Diameter of summit (micropylar depression) about $\frac{1}{3}$ base. Height rather more than width at base. The egg is attached to a grass culm.

I am indebted to Mr. Wolfe for the ova from which these descriptions were made. A one-sixth lens was used for the descriptions. —J. W. TUTT.

EGG OF *HIPPARCHIA SEMELE*.—Laid on a grass leaf; firmly attached at base; egg not quite perpendicular to surface to which attached; somewhat oval in shape, slightly narrower at base, white in colour with a very faint yellowish tinge; surface of shell shiny; the summit with a greyish cloud (probably head of contained larva). Under a two-third lens about 24 longitudinal ribs may be counted, some of which unite before reaching the apex. The micropylar depression scarcely distinguishable. Under a one-sixth lens the longitudinal ridges are somewhat raised, and traces of transverse markings extend between the ridges. Some of the ridges (as has been observed) unite towards the apex, but, as they approach the summit, end in concentric rings of hexagonal cells, which surround the rosette of minute cells placed quite at the apex and forming the micropyle. The trace of the micropylar depression is very indistinct. The egg is somewhat flattened on the top. The longitudinal ribs pass under the base at the point of attachment. The eggs were laid on August 23rd. Described September 8th. Hatched September 16th.

I am indebted to Mr. Wolfe, of Skibbereen, for ova of this species, which are, I believe, now described for the first time. Eight eggs obtained in captivity were laid by a female *H. semele* on its (or a companion's) middle pair of legs, a most extraordinary position.—J. W. TUTT. Sept. 8th, 1896.

NOTES ON COLLECTING, Etc.

CAPTURES IN EPPING FOREST.—Not having had much time to myself, I have done very little collecting this year. The following is, however, a list of specimens seen and captured in Epping Forest:—*Pieris brassicae*, common; *P. rapae*, common; *Euchloë cardamines*, one male captured; *Gonopteryx rhamni*, one seen; *Brenthis euphrosyne*, saw several; *Aglais urticae*, common; *Vanessa io*, captured one female; *Pararge megera*, three taken; *Epinephele ianira*, common; *Coenonympha pamphilus*, common; *Chrysophanus phloea*, common; *Polyommatus icarus*, common; *Cyaniris argioides*, rather plentiful, the males far outnumbering the females, only two of the latter taken; *Nisoniades tages*, two taken; *Pamphila sylvarum*, plentiful; *Zygacna filipendulae*, three taken; *Hylophila prasinana*, one captured; *H.*

bicolorana, one larva; *Nola cucullatella*, larvæ plentiful; two *Calligenia miniata*, one taken on the wing, the other taken at rest on a tree trunk, by my friend Mr. Mardle; *Erechlia jacobucae*, plentiful in one spot, flying in the sun, larvæ also common. *Hepialus humuli*, two males seen; *H. lupulinus*, abundant; *H. lectus*, rather common; *Porthesia similis*, very common; *Bombyx neustria*, larvæ common, but badly ichneumonated; *B. rubi*, very plentiful, flying in the sun; *Drepana falcataria*, not common; *D. binaria*, saw eight specimens, captured five, all males; *D. cultraria*, plentiful, but flying only while the sun was shining. *Triaena psi*, fairly common; *Diloba caeruleocephala*, larvæ common; *Leucania comma*, one captured; *Dipterygia scabriuscula*, fairly common; *Agrotis exclamationis*, common; *Triphaena pronuba*, very common; *Taeniocampa pulverulenta*, fairly common; *Calymnia trapezina*, larvæ very plentiful; *Aplecta nebulosa*, common; *Xylocampa arcola*, three taken; *Cucullia umbratica*, one taken at rest on a fence; *Euclidia mi*, several seen; *Brephos parthenias*, saw several, captured five, all males; *Uropteryx sambucaria*, took four females; *Rumia luteolata*, very common; *Venilia macularia*, common in one spot; *Metrocampa margaritaria*, common, and distributed nearly all over the forest; *Pericallia syringaria*, saw several; *Odontopera bidentata*, one taken at rest on a hornbeam; *Crocallis clingularia*, captured one female and two males; *Ennomos quercinaria*, one male taken; *Amphidasys strataria*, one female taken at rest on an oak tree; *Boarmia gemmaria*, two taken on a fence; *Tephrosia biundularia* (*crepuscularia*), common; *Pseudoterpnia pruinata*, four seen; *Geometra papilionaria*, one larva; *Phorodesma pustulata*, fairly common; *Hemithea strigata*, common; *Zonosoma porata*, saw one; *Acridalia remutaria*, common; *A. aversata*, common; *Cabera pusaria*, common; *Bapta temerata*, one taken; *Panagra petraria*, moderately common; *Ematurga atomaria*, very common; *Abraxas grossulariata*, common; *Lomaspilis marginata*, one captured; *Hybernia rupicaprararia*, common; *H. marginaria*, plentiful; *Anisopteryx aescularia*, common; *Larentia didymata*, captured two males; *L. multistrigaria*, two taken, male and female; *L. olivata*, captured three; *Melanthia ocellata*, common; *M. albicillata*, four taken; *Melanippe sociata*, common; *Campptogramma bilineata*, common; *Cidaria prunata*, three taken; *C. fulvata*, common; *Eubolia plumbaria*, common in damp places; *Chesias spartiata*, larvæ common on broom.—G. R. GARLAND, 94, Sedgwick Road, Leyton, Essex. October, 1896.

PLUSIA FESTUCE DOUBLE-BROODED.—When collecting to-night in the garden adjoining this house, I was much surprised at taking a fine fresh specimen of *Plusia festucae*, in perfect condition. I saw the insect flying over some French marigolds, and it subsequently settled on one of the flower heads, when I captured it with the net. Is it usual to take this species at this time of the year? Is it double-brooded? I have always taken it in June, but never saw it on the wing so late in the season before.—H. SHORTRIDGE CLARKE, F.E.S., Sulby Parsonage, Lezayre, Isle of Man. September 3rd, 1896. [The species is, we believe, always more or less double-brooded. We bred a long series, last September, from pupæ received from Mr. Cross. We have repeatedly taken it at light in August, in Wicken Fen, etc. Will correspondents please give their experience?—ED.]

I caught another specimen of *Plusia festucae* on French marigolds on the evening of September 10th.—IBID.

INSECTS AT HAMPSTEAD.—It may interest some of your readers to know that a friend of mine took a very fine specimen of *Catocala nupta*, settled on a wall in Lyndhurst Road, Hampstead, on Saturday, August 15th. Among other unusual visitors to Hampstead may be mentioned a specimen of *Cossus ligniperda*, taken at rest on a young sapling, near Hampstead Heath Station; and also *Smerinthus ocellatus*, caught in the booking office at Camden Town Station. *Dipterygia pinastri* has been plentiful at sugar, as usual.—F. A. NEWBERY, 10, Gillies Street, Haverstock Hill, N.W. September 19th, 1896.

FIVE-SPOTTED BURNET MOTH IN ISLE OF MAN.—I took a five-spotted Burnet here this year for the first time. I never knew it occurred here until this season. *Zygæna filipendulæ* is very common.—H. SHORTRIDGE CLARKE, F.E.S., Sulby Parsonage, Lezayre, Isle of Man.

DOUBLE BROODS OF LEPIDOPTERA IN SUFFOLK IN 1896.—The most peculiar point about the season of 1896 is—to my mind—the number of double broods. *Cyaniris argiolus*, July 28th, and into August, extremely abundant. *Brenthis selene*, *Noctua baia* (?), *Geometra papilionaria*, *Agrotis puta*, *Timandra amatoria*, *Drepana hamula*, *Cilix spinula*, *Strenia clathrata*, *Polyommatus astrarche*, *Acidalia inornata*, *Dianthoecia capsicicola* (sugar), *D. cucubali* (sugar), *Macaria notata*, *Ligdia adustata*, *Zonosoma annulata*, *Lophopteryx camelina*, *Noctua c-nigrum*, *Uranus pinetellus*, *Cidaria truncata*, *Leucania pallens* (very common), *Phaëtra rumicis*, *Noctua rubi*, *Phibalapteryx citibata*, *Acidalia arersata*, *Zonosoma porata*, *Z. punctaria*, *Z. orbicularia*, *Anaitis plagiata*, *Acidalia marginepunctata* (in confinement), *Dipterygia pinastri*, *Hadena trifolii*, *Melanippe fluctuata*, *Agrotis saucia*, *A. suffusa*, *A. segetum*, *Rumia crataegata*, *Orgyia gonostigma* (in confinement, 3rd brood now feeding), all taken in August. *Acidalia marginepunctata* (at large), *Plusia chrysitis*, *Leucania pallens* and *Agrotis segetum*, in September.—(REV.) C. R. N. BURROWS, Rainham Vicarage, Essex.

CAPTURES IN SUFFOLK.—Besides the species mentioned in the foregoing note as being probably double-brooded, I captured, during August, the following species: *Gonepteryx rhamni*, *Dryas paphia*, *Thymelicus thaumas*, *Enodia hyperanthus*, *Zephyrus quereus*, *Argynnis adippe*, *Eugonia polychloros*, *Hydroecia nictitans*, *Noctua dahlia*, *Lithosia complana*, *Miana bicoloria*, *Amphipyra pyramidea*, *A. tragopogonis*, *Agrotis nigricans*, *Porthesia auriflua*, *Clisiocampa neustria*, *Ennomos erosaria*, *Catocala nupta*, *Aplecta occulta*, *Noctua stigmatica*, *Cerigo matura*, *Noctua umbrosa*, *Luperina testacea*, *Boarmia gemmaria*, *Xylophasia polyodon*, *Leucania lithargyria*, *Calymnia affinis*, *C. trapezina*, *Sarothrips undulatus*, *Tryphaena fimbria*, *T. pronuba*, *T. ianthina*, *T. orbona*, *Mania maura*, *Noctua xanthographa*, *Agrotis tritici*, *Eupithecia subfulvata*, *Epione apiciaria*, *Hypsipetes clutata*, *Hadena oleracea*, *Catocala nupta*, *Apamea didyma*, *Dyschorista suspecta* (common on one evening), *Asphalia diluta*, *Luperina cespitis*, *Hydroecia micarea*, *Heptamelus sylvinus*, *Xanthia fulvago* (cerago), *Hyperba rostralis* and *Leptogramma literana*. In September, I took *Helotropha leucostigma* (*fibrosa*), probably belonging to a second brood.—IBID.

ADDITIONS TO THE RAINHAM LIST OF LEPIDOPTERA.—I have added several species to our local list, among others *Gonepteryx rhamni*, *Cyaniris argiolus*, *Acidalia marginepunctata* (promutata) and *Noctua stigmatica*.—IBID.

ABUNDANCE OF THE LARVÆ OF *ACHERONTIA ATROPOS*.—About seventy *A. atropos* larvæ have fallen to my share. The "Potato-diggers" bring them to me. Many, of course, are dead or dying, but I have 50-60 healthy pupæ.—*IBID.*

BUTTERFLIES AT SKIBBEREEN.—All our common butterflies were, I think, decidedly earlier than is usual, except perhaps *Pyrameis atalanta*, which was remarkably late and scarce, unlike 1893, when it swarmed, and *P. cardui* was here, as I believe everywhere else, totally absent.—J. J. WOLFE, Skibbereen, co. Cork. *Sept.*, 1896.

LEUCANIA IMPUDENS IN THE NEW FOREST.—I was sugaring at Ranmore, in the New Forest, on the night of June 24th, and captured a specimen of *L. impudens (pulorina)*. I was much surprised to find the species there, as I had never taken it before except in Wicken Fen, a damp place, whereas this was captured upon a clay hill, and I do not know of any reeds near. I found all the insects in the New Forest very early and plentiful; some very nice aberrations of *Limenitis sibylla* and *Dryas (Argynnis) paphia* were taken, the ab. *ralesina* being also fairly plentiful.—W. J. CROSS, Ely. [The New Forest is an old locality for *L. impudens*, see *Brit. Noctuae and their Varieties*, vol. i., p. 36.—ED.]

COLLECTORS AND CHATTENDEN WOODS.—On p. 83 of the *Entomologist's Record* there is a statement as to professional collectors in Chattenden Woods. Lord Darnley has as strong an objection to the dealer who makes a business of it as the Entomological Society of London can have; but the difficulty is to know him from the scientific amateur, and I do not know how to exclude one without the other. If you or your society can inform me who the offenders are, their passes will not be renewed.—C. H. SCRIVEN, Agency Office, Thong, Gravesend. *July 21st*, 1896.

A WEEK AT LYNDHURST.—I spent a week at Lyndhurst at the end of May, but not a very successful one. *Apatura iris* had not put in an appearance; Tate's usual beating of the sallows producing but two, so that was not good enough to set me sallow-beating. *Macroglossa bombyliiformis* (narrow border) was really over, the four we saw being badly worn. *Geometra papilionaria* had evidently spun up, and out of our way, whilst *Scodionia belgiaria* were going over, being neither plentiful nor in good condition. On the other side, *Bombyx trifolii* was more plentiful than usual, and *Cleora glabraria* worth looking for.—E. A. BOWLES, M.A., F.E.S. *Sept.*, 1896.

COLLECTING IN THE READING DISTRICT.—The season has been fairly successful. On some nights, moths were plentiful at the sallows, but of the usual common order. I except one *Dasyampa rubiginosa*, taken by a friend. At the same time, *Taeniocampa munda*, etc., came freely to sugar. *Asphalia flavicornis* also was very abundant at rest on the twigs of birch underwood. *Stauropus fagi* has turned up again in some numbers, the first being taken as early as April 26th, and it continued until well into June. The second brood was also bred in July by a friend. *Acontia luctuosa* was more than usually abundant in May. On the other hand, *Sesia spheniformis* was exceedingly scarce. A friend and myself spent three or four days working for it at Whitsun, and only obtained six between us, and, although we had a couple of virgin females, we only assembled one male. By working oak stumps that had been cut two years, I obtained

larvæ and pupæ of *S. cynipiformis*, and so bred a nice series, which was a welcome addition, as I had never obtained the species before. The spun-up leaves of the broad-leaved willow yielded a few larvæ of *Tethea retusa* and *Cloceris riminalis*. *Dicycla oo* has also unexpectedly turned up in some numbers; we only know of two specimens having been taken in this district before.—A. H. HAMM, 24, Hatherley Road, Reading. *Sept.*, 1896.

APPEARANCES OF *MELANIPPE FLUCTUATA*.—This species was abundant again (*vide, ante*, p. 88) from July 15th to July 23rd (when I left London), the specimens very fine and fresh. It began to appear again on August 28th, and was still to be seen here and there throughout this part of the S.E. district (Blackheath) up to the middle of September.—J. W. TUTT.

TROCHILUM CRABRONIFORME IN IRELAND. I have bred some half-dozen specimens of this insect from larvæ I found when cutting down some willows. The flowers in early July swarmed with the *Plusias* and *Cucullia umbratica*.—W. B. THORNHILL, Castle Cossey, Castle Bellingham, Ireland.

GALLS OF *PEMPHISUS BURSARIA*.—On a poplar in a steep narrow gully behind the village of La Grave, the galls of *Pemphigus bursaria*, Linn., were very abundant. I broke one open, and a large number of the perfect insects immediately made their escape. I am indebted to Mr. Newstead for the name of the gall.—J. W. TUTT.

EARLY EMERGENCE.—I took twelve *Timandra amatoria* the last week in May.—(Rev.) E. C. DOBRÉE Fox, M.A., Castle Moreton Vicarage.

OPORABIA DILUTATA.—*O. dilutata* is seldom taken here before the beginning of October, and is then very common in almost every wood where oak trees are to be found. Some of my specimens of this species are quite similar in size, colour and markings to specimens of *O. filigrammaria* from the Lancashire district.—A. ADIE DALGLISH, Pollokshields, Glasgow. *Sept.*, 1896.

ABUNDANCE OF THE FIRST BROOD OF *CYANIRIS ARGIOLUS*.—The first brood of this species was common here. I never knew it common before. I also hear from Worthing that it has been unusually common there. My impression is that the spring brood is more plentiful than the August brood, but, as the insect is not usually common here, I have no great experience to go by.—W. M. CHRISTY, M.A., F.E.S., Watergate, Emsworth, Hants.

SECOND BROOD OF *CYANIRIS ARGIOLUS*.—This year, the first brood of *C. argiolus* was abnormally abundant, and the second brood was on the wing on June 28th, an unusually early date. It occurred in about the same numbers as the first brood. The females of the second brood were very scarce, only about one specimen to fifty males. I find that they are very fond of the flowers of the *Ceanothus*, Gloire de Versailles, which is in bloom on a wall, when the sun is shining, coming to and going from the blossoms from 9 a.m. until 4 p.m. The colour of the flowers of this beautiful climber are, as nearly as possible, that of *C. argiolus*.—J. MASON, Clevedon Court Lodge, Somerset. *Sept.*, 1896.

HONEYDEW.—Sugar was very unproductive in June and early July, owing to the vast amount of honeydew, which was then actually dropping from the trees.—IBID.

CHRYSOPHANUS DISPAR.—In May last I forwarded to the *Record* an extract from the *Bazaar*, offering for sale living specimens of three large “English Coppers,” and three “Camberwell Beauties,” remarking at the same time that I had written for further particulars. This I did, asking Mr. J. W. Tattersall (the advertiser in question) for full details in order that these important captures might be duly recorded. I received a most courteous reply to my query from Mr. Tattersall, informing me that the insects were all taken “in the neighbourhood of Beaumaris, N. Wales,” and that he was much surprised (as an entomological novice) at the number of replies evoked by his “ad.” He further informed me that he had disposed of them “to a gentleman who refused to give his name and address, but got all particulars as to locality, etc., and remarked that he contributed to the magazines,” winding up with the remark that he identified them by Gordon’s *Our Country’s Butterflies and Moths*. I wrote him again, pressing for more exact information, and pointing out the rarity (to say the least of it) of the “Large Copper.” To this, Mr. J. W. T. (not our worthy editor, by the way) replied that he, “or more strictly speaking, my brother caught them, but, at present, I will not give the exact locality, as I know, *from experience (!)*, that a swarm of collectors would soon be on the spot, and, so far, I have not been able to follow up entomology solely for pleasure!” He goes on to remark that he has caught “a very fine butterfly or moth,” which he is unable to identify, it being “1½ inches across the wings, and entirely black and quite sooty in appearance, also several fine cinnabar butterflies, but I do not know whether they are common or not.” He finishes by asking me if I can tell him where he can purchase “a list of the market prices of butterflies, &c.” Here I dropped the matter, owing to my holidays intervening. I should be sorry to doubt the correctness of Mr. Tattersall’s statements, for his letters are courteous in the extreme, and would rather think that he had “mis-identified” his insects, which seems to me just possible from what I have seen of the plates he mentions. This supposition, however, hardly fits in with the fact that he disposed of them immediately on the day that the advertisement appeared! Will not some Liverpool reader “beard the lion in his den,” and try to get at the root of this mystery?—S. J. BELL, 150, Stockwell Park Road, Brixton. *Sept. 15th, 1896.*

PUPA DIGGING IN THE NEW FOREST.—I recently spent a few days in the New Forest, and although there is little in the way of lepidopterous imagines in the New Forest so late as the end of August, especially in an early season, I did very well at pupa-digging, and obtained over 200 pupæ of all sorts and sizes. Sugaring produced only *Amphipyra pyramidea*.—HAROLD HODGE, M.A., 6, Crown Office Row, Temple. *Sept., 1896.*

SYNIA MUSCULOSA AS A BRITISH INSECT.—It seems strange that, in the face of Mr. S. Stevens’ assertion that at least 15 specimens of *Synia musculosa* were, to his certain knowledge, taken at and near Brighton early in the present half-century, “John Bull” should still be apparently so sceptical as to its having occurred in Britain. But if he had thought of referring to the *Ent. Annual* or the *Ent. Wk. Intelligencer*, he would have found that any such scepticism was quite unjustifiable. In *Ent. Ann.*, 1856, p. 46, Mr. Stainton records the capture, on August 17th, 1855, of an example of *S. musculosa*, on a

gas-lamp at Brighton, by Mr. Winter [We learn, *op. cit.*, p. 25, that his fuller name was "John N. Winter," and that he was of the Sussex County Hospital, and Mr. Stevens says that he was house-surgeon there], and a coloured figure of the insect is given on the *frontispiece* to that volume. As Mr. Stevens tells us that Dr. Winter still resides at Brighton, "John Bull" has in him exactly what he has been wanting to hear of, *viz.*, "a living lepidopterist who can honestly say that he has captured at large (wild) a living specimen of *S. musculosa* in Britain." Again, in *Ent. Wk. Int.*, i., p. 154, Mr. A. J. Wigginton, writing from the Sussex County Hospital, Brighton, on August 8th, 1856, says, "I took last evening a very beautiful specimen of *S. musculosa*;" whilst, on p. 173, Mr. Henry Cooke, of 8, Pelham Terrace, Brighton, under date August 25th, 1856, records the recent capture by himself of an example, which was flying round a lamp in that town. These two captures are alluded to in *Ent. Ann.*, 1857, p. 115. Then, in *Ent. Wk. Int.*, v., p. 12, Dr. W. H. Allchin, of Bayswater, has a note to the effect that he took a very fine *S. musculosa*, which had been so identified by Mr. F. Bond, at rest on a flower at Brighton, on August 15th, 1858; and in *Ent. Ann.*, 1860, p. 140, under the heading, "Rare British species captured in 1859," Mr. Stainton says that at the September meeting (1859) of the Ent. Soc., London, Dr. Allchin exhibited a specimen taken at Brighton. Presumably this latter was taken by Dr. Allchin, but was a different individual from the former, for Stainton notices it among the captures of 1859, and thirteen months elapsed between Allchin's capture of 1858 and his exhibit of 1859. The above records, which are all the reliable ones that occur to me, are sufficient to prove beyond dispute that the species used to occur at Brighton some forty years ago, and I have reason to believe that the sum total of specimens then taken there certainly exceeded the number given as a minimum by Mr. Stevens. It seems equally clear that it disappeared from there not long afterwards [which accounts for the Salvages not having confined their attention to their own "back doors!"], and I have been informed that this was due to its head-quarters having been built over. I know nothing about the reputed Bexhill specimens in Mr. C. E. Fry's collection, and cannot mention any authentic British captures made of recent years, or made elsewhere than at Brighton. It is a well-known fact that of nearly all the Lepidoptera that are very rare in Britain, there are in collections in this country plenty of *so-called* "British" specimens, which have no right whatever to the name; but it seems to me unwise to publicly question the occurrence of any species in Britain when satisfactory published evidence of it is so easily accessible; and in the case of *S. musculosa*, and numbers of other rarities that I could name, the authentic *recorded* captures known to the many are largely outnumbered by the *equally* authentic *unrecorded* ones, known only to the few who are "behind the scenes." EUSTACE R. BANKES, M.A., F.E.S., The Rectory, Corfe Castle. *Sept.*, 1896.

CURRENT NOTES.

We trust that Mr. Briggs will exhibit the specimen of the new British moth (supposed to be *Calophasia platyptera*), taken on September 14th, by Mr. J. T. Carrington, on the Sussex coast (between three and

four miles west of Brighton), at the approaching meeting of the Entomological Society of London.

On October 27th and 28th the first part of the collection of Mr. C. A. Briggs will be sold. The collection is especially rich in hermaphrodite and gynandromorphic forms of many of the Diurni - (*Gonopteryx rhamni*, *Euchloë cardamines*, *Plebeius aegon*, *Polyommatus bellargus*, *P. icarus*, *P. corydon* and *Cyaniris argiolus*. There is an unequalled series of underside aberrations of the "blues," of "bleached" forms of *Epinephle ianira*, and unique aberrations of many other species. The *Chrysophanus dispar* will be distributed over the four days' sale. The first day's sale (Oct. 27th) will comprise part of the Diurni; on the second day (Oct. 28th) the remainder of the Diurni and part of the Sphingides will be sold.

Mr. Champion (*E.M.M.*) advises the use of "gum arabic mixed with a little loaf sugar, to give consistency, and an infinitesimal quantity of carbolic acid (mixed with a small amount of spirit)" instead of "gum tragacanth," for carding small Coleoptera, Hemiptera, etc. He adds: "Dr. Sharp's recipe for the preparation of gum arabic is: 'Best gum arabic, 60 parts; loaf sugar, 30 parts; strong spirits of wine, 8 parts; and purified carbolic acid, 2 parts. Dissolve the gum and the sugar separately in as little water as possible, and then mix thoroughly together. Dissolve the carbolic acid in the spirit, and add it drop by drop to the larger mixture, stirring thoroughly while doing so.'"

Mr. Hamm states that *Pamphila communis* feels with its ovipositor several blades of grass before selecting one on which to deposit an egg, which is always laid singly, although a second may be deposited within half an inch of the first. The eggs are also laid on leaves and stipules of clover.

Acherontia atropos is recorded from Culross, N.B. (imago, Sept. 11th); Swanage (imago, Sept. 9th); Fleetwood (larvæ); Panton and Market Rasen (larvæ); Kingston, Oxon. (larvæ); Lewes (larvæ); Littlehampton (larvæ); Hay, Brecon (larvæ).

When a first-class field naturalist forms an opinion on a set of facts, differing from that formed by other observant naturalists from the consideration of the same facts, one likes to get to the bottom of the cause. This we are now able to do with regard to Mr. C. G. Barrett's oft-repeated opinion that *Tephrosia bistortata* (*crepuscularia*) and *T. crepuscularia* (*biundularia*) are identical. He states (*E.M.M.*) emphatically that "the second brood of the brown *crepuscularia* (= *bistortata*) is obviously *biundularia*." Arguing from such erroneous premises as these, Mr. Barrett's conclusion is quite understandable.

Some years ago, it appears, Mr. Doubleday named the aberration of *Polygonia c-album*, with ochreous underside, *ab. hutchinsoni*. Recently, Mr. W. Harcourt Bath, evidently not *au fait* with previous literature, re-named it *ab. lutescens*. It is, of course, the *ab. pallidior* of old Petiver and other British authors, so that both *hutchinsoni* and *lutescens* are much ante-dated.

Mr. Sidney Cooper, of Chingford, records (*Entom.*) the capture of what is apparently another specimen of *Catocala nupta* *ab. caerulescens*. Mr. Sabine records the capture of a gynandromorphous *Chrysophanus phlocas*, left wings ♂, right wings ♀. The Rev. A. D. Pattison records *Deilephila livornica* from Lymington, whilst Mr. A. R. Upton

records *Chocrocampa nerii* from the village of Stowting, in Kent. *Euraneusa antiopa* is recorded (*Field*) as captured on Sept. 10th, on the slopes of Scurr na Gillean, in Skye, by Mr. P. M. Ellis.

The advantages of high-flat setting are lauded periodically, once in about 7 or 8 years. The last bad attack was in 1888, and it may be traced back in about arithmetical progression to the days of the *Intelligencer*. The time elapsing between the outbreaks allows a new lot of men to come in. The newer men with small collections, etc., prefer a change, the older ones do not see what is to be gained by it, nor do we. Our advice to young entomologists who may be inclined to adopt it, but who want to exchange with the more experienced collectors, is, "Don't." We have no personal bias, and examine annually some hundreds of insects, set in various ways, from the low English to the high Continental, and we fail to see any great advantage or disadvantage either way. Mr. Cant, who opened the discussion in 1888, sets thousands of insects, professionally, annually, for a collection set entirely in the Continental fashion. Mr. Leech, who opened it in 1896, employs a professional setter. Neither of these gentlemen, probably, understands the purely British collector's position.

SOCIETIES.

SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—Sept. 10th, 1896.—Mr. A. E. Hall exhibited a grand female of the large WEST AFRICAN *Termes bellicosus*, from Cape Coast Castle. ALSO CAPTURED CALLIMORPHA HERA from Newton Abbot. This was considered interesting, as showing that the species had a more extended range than was at first supposed. Mr. Lucas: a FEMALE of *Platetrum depressum* HAVING MALE coloration, and a male of *Calopteryx virgo* having the right wing without any trace of the usual dark pigment; also a pair of the rare grasshopper, *Thaumotrixen aptera*. Mr. Montgomery: bred specimens of *Dianthocia capsincola* from Eastbourne. One specimen was a beautiful form, having the submarginal line with the usual zigzags very clear, while the marginal area was without the customary wavy markings. Sept. 24th, 1896.—LARVÆ OF CYANIRIS ARGOLUS.—Mr. R. Adkin, living larvæ of *Cyaniris argiolus*, *in situ* on the buds of ivy blossom, from Eastbourne. These were distinctly of two forms, one purplish, the other green. He also exhibited full-fed larvæ of *Aplecta occulta*. ABERRATIONS OF ENODIA HYPERANTHUS.—Mr. Filer, a fine aberration of *Enodia hyperanthus*, having the white spots surrounded by yellow rings only, the black rings being entirely obsolete. It was taken in Essex. EXOTIC INSECTS.—Mr. Moore, specimens of *Thelyphonus giganteus*, a species midway between the scorpions and the spiders, from Florida, and contributed notes. He also shewed specimens of *Polistes annularis*, and a nest. ABERRATIONS OF NOCTUÆ.—Mr. Turner, a varied series of *Noctua xanthographa*, including a black form, a pale form, a red form, and a form with unusually well-defined stigmata; a very dark *Agrotis segetum*, from Kent; a *Triphaena pronuba*, with a remnant of a discoidal spot; and two bred *Apatela aceris*, with the veins of the secondaries deeply lined with black. NOCTUA DITRAPEZIUM IN YORKSHIRE.—Mr. Montgomery, specimens of *Noctua ditrapezium*, from S. Yorks. TEPHROSIA BISTORTATA (CREPUSCULARIA) AND T. CREPUSCULARIA

(BIUNDULARIA).—Mr. Barrett exhibited series of *Tephrosia bistortata* (*crepuscularia*) and *T. crepuscularia* (*biundularia*), the latter very variable. He then exhibited a box containing two typical *T. bistortata*, of the early brown form, and three specimens of the second brood of *T. bistortata*, bred by Mrs. Bazett. These were of the ordinary dead-white (with a faint leaden tint) colour, and of the form (var., Gen. 2, *consonaria*, Haw.) so well-known to those who have reared this insect. In the same box were two typical *T. crepuscularia* (*biundularia*, the May-June species), and also eight specimens, which Mrs. Bazett had had given to her, and which were captured in July last, at light, in a wood near Reading, in which the early species (*bistortata*) has never been found but in which the later species (*crepuscularia*) is abundant. On this assumption, Mrs. Bazett considered that the eight specimens must be the progeny of the later species, and the opinion of Mr. C. G. Barrett coincided with this. Mr. Adkin considered that the fact of Mrs. Bazett not having found *T. bistortata* in that particular wood was no proof that the insect did not occur there, and that the evidence that these specimens were a second brood of the later species was, therefore, altogether inconclusive. Mr. Tutt agreed with the opinion expressed by Mr. Adkin, and, after careful examination of the species, said that he was as certain as he could be, without having actually seen the female lay the eggs from which they were produced, that the specimens were a second brood of the early species, *T. bistortata* (or *crepuscularia* as the species used to be called). He had bred the species repeatedly, perhaps a dozen different times, and had no hesitation in referring them to a second brood of the early species, and not the later one. The two typical *crepuscularia* (*biundularia*) in the box were of an entirely different tone and character from these Reading, July specimens. After further discussion, it was decided to adjourn the matter for further consideration until the next meeting, to give members the opportunity of exhibiting their own series.

LANCASHIRE AND CHESHIRE ENTOMOLOGICAL SOCIETY.—An exhibition meeting was held on Sept. 14th, under the presidency of Mr. S. J. Capper, F.L.S., and was decidedly successful, the number and variety of exhibits being in excess of those of any previous meeting. Some of the more notable exhibits were as follows:—The President: a drawer containing 300 aberrations of *Spilosoma lubricipeda*, including abs. *eboraci* and *radiata*, and many other fine aberrations, and a similar drawer of *S. menthastri*, including a long series with brown upper wings. By Mr. B. H. Crabtree: a very long series of *Coenonympha tiphon* var. *philoxenus*, from Witherslack, three very light *Brenthis* (*Argynnis*) *euphrosyne*, and two dark *B. selene*, and a drawer of SESIIDÆ, including *Sesia spheniformis*, *musciformis*, *ichneumoniformis*, *chrysidiformis* and *scoliiformis*. Mr. Harold Milne: long series of *Erebia aethiops* and *Cloanthia solidaginis*, an extreme form of *Plebeius aegon* var. *corsica*, a magnificent *C. tiphon*, having the ocellated spots very large and elongated (similar to an ab. of *Enodia hyperanthus* recently figured), a fine *Euthemonia russula*, with immaculate hind-wings, a melanic *Macaria liturata*, and a very large *Abraxas grossulariata*, deeply suffused with yellow. Mr. Joseph Collins: a collection of Moss insects, including fine series of *Carsia imbutata*, *Hydroecia petasitis* and a melanic race of *Cymatophora duplaris*. Mr. T. G. Mason: series of *Hydroecia paludis*, *Dasychira fascelina*, and a black ab. of *C. duplaris*. Mr. R. Tait: imagines and living larvæ of *Agrotis candellarum*

var. *ashworthii*, a splendid ab. of *Asphalia ridens*, having the base and apex broadly light, and the central fascia very dark, and a Noctuid which is probably an ab. of *Agrotis agathina*. Mr. Prince: series of *Bombyx trifolii*, and two *Leucoma salicis*, with the outer margins of the fore-wings suffused with smoky black. Mr H. Bickerton Jones: series of *Leucania littoralis* and *Dasychira fascelina*, including two asymmetrical ♂s, both having black blotches on the costa of the left upper-wing; also a box of Geometrids, including *Psodos trepidaria*, *Hyria auroraria*, *Asthena blomeri*, *Lobophora rietata* and *Phibalapteryx lapidata*. Mr. F. N. Pierce: abs. of *Chrysophanus phlocas*, and a curious malformation of *Strenia clathrata*. Dr. J. Harold Bailey: a collection of Coleoptera, from the banks of the Ribble, including *Bledius subterraneus* and *B. pallipes*, and *Telephorus paludosus*, which is new to Lancashire.—H. BICKERTON JONES, Hon. Sec., 180, Lodge Lane, Liverpool.

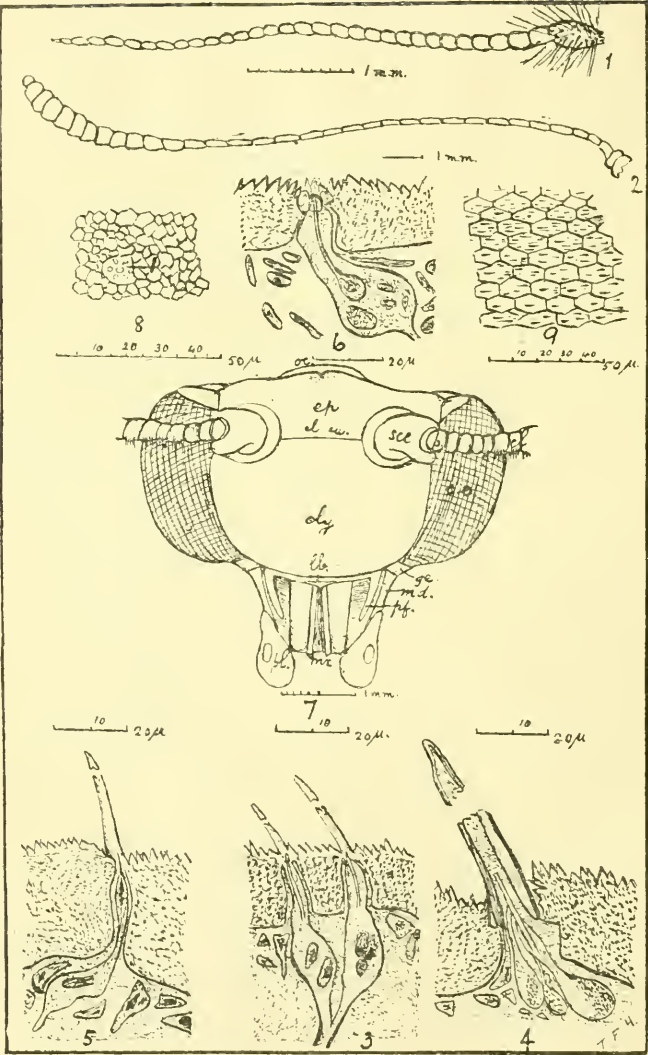
THE NORTH LONDON NATURAL HISTORY SOCIETY.—The 5th Annual Pocket-Box Exhibition was held on Thursday, September 29th, 1896. Mr. R. W. Robbins exhibited *Parnassius apollo*, several Erebias, Lycenas, etc., from Lucerne; also British Lepidoptera, including *Bombyx trifolii*, from Lyndhurst; *Stauropus fagi*, from Oxshott, etc.; Mr. Battley exhibited specimens of *Sesia chrysidiformis*, *Tapinostola morrisii* (*bondii*), *Xylophasia sublustris*, *Lithosia griseola*, *Eupithecia coronata*, and *Acidalia imitaria*, from Folkestone; also *Lithosia complana*, *L. mesomella*, *Minoa murinata*, and *Herminia derivalis*, from Canterbury.

REVIEWS AND NOTICES OF BOOKS.

DIE SATURNIIDEN (NACHTPFAUENAUGEN), by A. Radcliffe Grote, M.A. Mit 3 Tafeln und 18 Zinkgraphien. Juni 1896. [Published by August Jax, Hildesheim. Price 8 marks].—This is an excellent piece of work, being a revision of the SATURNIIDES, and is notable as containing the first illustrations of living Lepidoptera by means of photography. Scientifically, it demonstrates the fact that there are only two families in this superfamily, *viz.*, SATURNIIDÆ and AGLIIDÆ. It attempts to show, from the study of the newly-hatched larvæ of *Endromis* and of *Bombyx mori*, that these are not Saturniids, but are allied to the Lasiocampids, and belong, in reality, to the superfamily AGROTIDES, as defined in the *Systema Hildesiae*, but which is now called BOMBYCIDES. To those who are working at this superfamily, the publication is indispensable, and the Catalogue of the Saturniids of America and Europe, with their distribution, etc., is excellently worked out. The photographic illustrations, referred to above, are exceedingly good, as also are the illustrations (antennæ, neurulation, etc.) scattered throughout the book.

ERRATA.—p. 162, line 12, for "155," read "133"; p. 175, line 2, for "13th," read "18th."

THE NEURATION OF SPHINX LIGUSTRI.—On comparing my original drawings with *Ent. Rec.*, Vol. viii., Plate i., I find that fig. 7 (*Sphinx ligustri*) wants another hind-wing nervule close to the lower margin (there should be two nervules). This escaped my notice when I examined the proof. I have rectified my own copy by filling in with ink, the required nervule.—AMBROSE QUAIL, Sept. 22nd, 1896.



ANTENNAE OF LEPIDOPTERA.

The Entomologist's Record AND

JOURNAL OF VARIATION.

VOL. VIII. No. 10.

NOVEMBER 1ST, 1896.

The Antennæ of Lepidoptera. Their structure, functions and evolution.

By J. W. TUTT, F.E.S.

In his *Evolution and Taxonomy*,* Professor Comstock suggests that "the logical way to determine the affinities of a group of organisms, is first to endeavour to ascertain the structure of the primitive members of this group, and then endeavour to learn in what ways these primitive forms have been modified by natural selection, keeping in mind that, in each generation, those forms have survived whose parts were best fitted to perform their functions."

Among the various structures that have been thus utilised as a basis of study, in order to show which insects have a close genetic relationship, are the antennæ.† There can be no doubt that community of descent affords the surest guide to similarity in the greatest number of characters, and we can agree with Dr. Bodine that entomologists can now congratulate themselves that, "from a dry and wearying process of sorting and pigeon-holing different forms for convenience in management, we have advanced to a study of their development, and the varying lines of descent through which they have attained their present condition."

The natural position of the antennæ varies greatly in different species. In some Lepidoptera the antennæ "are directed nearly cephalad; in others, almost as nearly caudad, and all possible positions between these extremes may be assumed." Dr. Bodine says, that after considerable study of the natural attitude of the antennæ in living specimens, both in flight and at rest, the conclusion has been reached that "the normal position is assumed when the antennæ are extended directly laterad, with the most specialised surfaces ventrad, and the pectinations, where they exist, arising from the ventral surface," although some exceptions are afterwards noted.

The antennæ belong to the preoral somite. They are slender segmental organs, placed symmetrically one on each side of the meson, and in the PAPILIONIDES and HESPERIDES, according to Scudder, and probably in all other Lepidoptera, are inserted at the ends of the suture (Pl. II., fig. 7, *cl. su.*), between the epicranium (fig. 7, *ep.*) and clypeus (fig. 7,

* "Evolution and Taxonomy," *Wilder Quarter-Century Book*, Ithaca, N.Y., 1893, pp. 38-39.

† "The taxonomic value of the antennæ of the Lepidoptera," by Donaldson Bodine, *Trans. Am. Ent. Soc.*, Jan. 1896. Price 3s.

ely.). Kolbe* says: "In the Diptera, Lepidoptera and Trichoptera, whose mouth-parts are stunted, absent or transformed into sucking organs, the antennæ are brought very near each other, while in biting insects, they are usually separate from each other." The antennæ of *Micropteryx*, which has retained its mouth parts, are relatively far apart, and hence appear to bear out this generalisation.

The proximal segment of the antenna is called the scape (fig. 7, *see.*). Next to it is the pedicel (fig. 7, *p.*), the two together being sometimes known as the base. The remaining segments make up the clavola (fig. 7, *cl.*). Among moths, the latter is often pectinate, when that part of the antenna made up of the bodies of the segment is called the shaft, and the projections, the pectinations. Among the PAPILIONIDES, HESPERIDES and, to a less extent, the ZYGÆNIDES, the clavola is divided into the funicle or stalk, and a clavate portion or club. The scape is somewhat rounded at the end, and is inserted into a little cup-like depression in the head, so that a very serviceable ball-and-socket joint is produced in some species. This explains the freedom of movement often observed.

Although the scape is abundantly supplied with strong, striated muscles, the other segments appear to be devoid of muscular tissue. The chitinous parts of all the segments are held together by a tough flexible membrane, and it is due to the elasticity of the latter that, when the clavola is bent by external force, it is able to resume its original shape. The clavola itself consists of (1) The chitinous parts of the segments held together as just described. (2) A layer of dermal and nerve cells, with numerous interlacing nerve-fibres just within the chitinous coat. (3) A large tracheal trunk, supplying branches to the segments. This lies along the ventral part of the shaft. (4) A pair of large nerves, which come from the frontal ganglion, and send out branches to the various organs of sense located in the antennæ. These nerves are just by the side (dorsad) of the trachea. (5) The remainder of the substance in the antenna is blood, which bathes the tissues, and nourishes them.

The chitinous covering of the antennæ is supposed to be formed by secretion from the dermal cells directly underlying it. Its surface is frequently marked into roughly hexagonal areas (Pl. II., figs. 8-9), which, in *Notolophus* (*Orygia*), are limited by thin continuous ridges of chitin. Frequently the surface is broken up into fine points and ridges, and the outlines of the plates are thus obscured.

The many structures found on the antennæ of Lepidoptera are regarded by Bodine as modifications of a simple hair. "Each has its origin in a hypodermal cell, and is, therefore, connected with the interior through a pore-canal. The simplest form is that of a simple protective hair. When the hair is flattened out, we have the typical scale, which also rises from a hypodermal cell. The antennal scales are inserted differently from those found on the wing membrane." "The pedicel or stalk is set in a goblet-shaped cell, lying in the chitin, with its long axis nearly perpendicular to the surface, but pointing slightly distad. The bottom of the cup is at the end of a pore-canal, but there is no evident vital connection with the interior." In the scales which are inserted in the wing membrane, "the cups have their long axes nearly parallel with the surface, and they seem rather to be built up upon the membrane, than to be hollowed out of it."

* *Einführung in die Kenntniss der Insekten*, von H. J. Kolbe, Berlin, 1893.

Bodine describes a patch of extremely long, but little specialised, scales on the dorsal surface of the scape. These sometimes form striking tufts. On the clavola the scales are more specialised, and in moths, for the most part, are arranged on the dorsal surface in two transverse bands. The antennal pectinations also, in some species, bear scales. "Even in those antennæ which are scaled apparently over their whole surface, there is a comparatively free space on the ventral and more highly specialised face" (Bodine).

There are, at least, six kinds of antennal organs which are in communication with nerves, and are, therefore, presumably organs of special sense. These are:—

(1) Short, slender, pointed sense-hairs, hollow, but closed at the free end. They are attached to the chitinous ring at the end of a pore canal, and are usually more or less flexible. From the interior a nerve fibre (from the antennal nerve) enters the cavity of the hair. This type of sense-hair is found very generally in Lepidoptera (JUGATÆ, FRENATÆ and butterflies) (Pl. II., fig. 3).

(2) Long, and very stout rigid bristles, closed at the end, easily recognised by their thick base and tapering form. They vary greatly in size, and more than one nerve-cell is in connection with this kind of sense-hair. There are but few found on a single segment (Pl. II., fig. 4).

(3) Long, stout stiff hairs, hollow and closed at free end. It is very like the first type, but the nerve cell is smaller, and the hair is more firmly attached. Their distribution is limited, and they are said not to occur in the JUGATÆ, HESPERIDES and PAPILIONIDES (Pl. II., fig. 5).

(4) Pits or depressions, guarded at the opening by stiff projections of chitin, and containing single rods or cones, connected with nerves from the interior (Pl. II., fig. 6). Sometimes two or three pits grow together. Among the butterflies they are much deeper. In *Pyrameis cardui* there is a circle of stiff points around the base of the cone. A similar circle is described in *Vanessa io* by Hauser. These pits are found usually on the ventral surfaces of the shaft and pectinations, whilst in the butterflies they are most numerous on the club, but sometimes extend to the other segments.

(5) Short conical projections, which have become so thick as to lose their character of hairs, and, in a manner, resemble an everted pit (4), the nerve apparatus being similar to that described under the first type of sense-hair, and like that which supplies the pits. The apex varies—blunt, pointed, hollowed, etc. These sense-cones are found in all the FRENATÆ, but not in butterflies, nor in the JUGATÆ.

(6) Another set of nervous apparatus is always situated in the pedicel. It consists of a number of nervous rods, which are gathered into small conical bundles, and terminate within pores situated in the membranous ring which connects the chitinised walls of the pedicel and the proximal joint of the clavola. It will be at once evident that any movement of the clavola upon its base, whether caused by contact or vibration, would be at once felt in the membrane in which these rods lie. As there are rods in every part of this membrane, a definite impression of the movement would be produced in the sense-rods.

The presence of so many nervous structures in the antennæ leaves no doubt that these organs are the seat of more than one special sense. Different as must be the range of perception in insects,

compared with that of our own, yet there must be considerable similarity in the organs, due to the fact that the external forces work through the same media in both cases.

(To be continued.)

DESCRIPTION OF PLATE II.—(The figures after Bodine).—Fig. 1.—Antenna of *Micropteryx semipurpurella*, cephalic aspect. Fig. 2.—Antenna of ♂ *Papilio polyxenes*, cephalic aspect. Fig. 3.—Part of transection of clavola of ♂ *Callosamia promethea*, showing sense-hairs of first type. Fig. 4.—Part of longisection of clavola of ♂ *Callosamia promethea*, showing sense-hair of second type. Fig. 5.—Part of transection of clavola of ♂ *Callosamia promethea*, showing sense-hair of third type. Fig. 6.—Part of the transection of clavola of ♂ *Callosamia promethea*, showing pit and rod. Fig. 7.—Dorso-cephalic aspect of denuded head of *Sphinx* [*oc.* = occiput; *ep.* = epicranium; *cly.* = clypeus; *cl. su.* = clypeal suture; *sc.* = scape; *p.* = pedicel; *cl.* = clavola; *lb.* = labrum; *ge.* = gena; *md.* = mandible; *pf.* = pilifer; *mx.* = maxilla; *c.e.* = compound eye; *pl.* = palpi.]. Fig. 8.—Chitinous surface of ♂ *Pyrusta oxydalis* (1. Pit and rod). Fig. 9.—Chitinous surface of ♂ *Papilio polyxenes*.

Notes on *Cœnonympha tiphon* and its allies.

By H. J. ELWES, F.Z.S., F.L.S., &c.

Whilst staying in Westmoreland recently I had an opportunity of taking, for the first time in Great Britain, *Cœnonympha tiphon* (following Staudinger, I use this name in preference to that of *darus*, which, though older, is of doubtful application to the species), on a large moss between Witherslack and the estuary of the Kent, near Milnthorpe. The insect was in great abundance, and the females quite fresh about the middle of June, and, though very variable, both in ground colour of the wings and in the number and size of the ocelli, were of the form called *philoxenus*, (Esp. *rothliebi*, Stgr.), which is typical of such low-lying mosses in England, and is found in similar situations near Bremen and Hamburg, but not further east in Germany, as far as I know. A few days later, on the Redesdale Moors, in Northumberland, at an elevation of about 1,000 feet, I found the same insect abundant on grassy hills of the typical Cheviot character, that is to say, where the grass is more luxuriant than the heather, and the moors are consequently better for sheep than grouse. Though I kept the insects separate, I did not label them before sending them to be set, and now I have got them back I cannot distinguish the specimens from the two localities, though at the time I thought the Northumberland ones were lighter in colour. On referring to Newman, I find that this form is confined to England, whereas the form *laidion*, Bork. (*darus* of English collectors), is found in Scotland and Ireland. I have in my collection a series of both from Sang's and Harper's British collections, and some of *darus* from the Hebrides. Though amongst these there are a few specimens which have the pale colour of *laidion* and the large ocelli of *philoxenus*, and others, which have the dark colour of *philoxenus* and the underside of *laidion*, yet I cannot say that the two forms run into each other. On comparing the English with the Continental specimens in my collection, I find that those from Stettin and Berlin, both of which are taken in low-lying peat moors, are like the Scotch form on the underside, but of a darker colour above, and the ocelli below much more conspicuous. In the Alps the insect is comparatively rare. I have only taken it myself in the Vorarlberg, in the first week of August,

where it is confined to a flat peat moor, frequented by capercaillie and *Colias palaeno*. There is another form, known as *isis*, Thunb., which I have from Esthonia, Finland, and a single locality in the North Trondhjem province of Norway; these have the underside of *tiphon*, but are smaller and less ocellated, and often as dark as *philoxenus*. From Turkestan and Siberia I have a very small pale non-ocellated form, described by Staudinger (*Stett. Ent. Zeit.*, 1886, p. 251) as *cacca*, which he says (and I quite agree with him), is not improbably either a variety or the stem-form of *tiphon*, although they are hardly half as large and much paler ochre-yellow. Staudinger says that the entire want of ocelli, in the twenty-four examples which he received of *cacca*, is very surprising, notwithstanding that the disappearance of the whole or some of the ocelli in the Satyridæ, is not unusual. Next I have a form from the Vilui river, in North East Siberia, sent to me as var. *viluensis* of Ménétris by Alpheraky, which is like *isis* in size and markings, but of a pale grey fawn-colour above, and without ocelli. What has been described by Leech (*Butt. China, etc.*, p. 96, Pl. xi., fig. 3) as *tiphon* var. *tydens*, in my opinion, has no affinity with *tiphon*, but rather belongs to the species named *sinica*, by Alpheraky (*Rom. Mém. sur Lep.*, v., p. 121, Pl. v., fig. 7), and is more nearly allied to *rinda*, Mén., from Amurland, both of these having a distinct line beyond the ocelli on the hind-wing below, of which there is no trace in any form of *tiphon*. Next we come to the numerous North American forms, which have received many names from W. H. Edwards. I have a good series of most of these, taken by myself and others. Though they differ considerably *inter se*, there is nothing like the same amount of difference that there is among the European and Asiatic forms, and some specimens from Montana are indistinguishable from typical *tiphon*. The only ones which, so far as I can see, are worthy of even varietal names are *inornata*, of which *ochracea* is but a synonym. Though Strecker, in his Catalogue, keeps these distinct, he states that he has no doubt that *ochracea* is a variety of *tiphon*, and Kirby, in his Catalogue, puts *inornata* as a variety of *tiphon*. Of this form the darkest specimens are those from the Black Hills of Montana; some from the Yellowstone Park, taken by myself in June, 1888, are smaller and paler, as are those which I have taken in various parts of Colorado, from 7–10,000 feet, and at Laggan, Alberta, in the Northern Rocky Mountains, at 5,000 feet. On the Pacific coast, however, a usually paler form occurs, which I found very common on the 20th May, at Victoria, B.C., and which Morrison took as late as the 21st July, in the same place, proving that two broods occur, though I see no difference between them. Morrison sent me the same form from Washington Territory, and Professor Owen, from Fort Klamath, Oregon. These are usually known under the name *ampelos*, W. H. Edw. From Nevada I have a pair of what seems to me quite the same species, under the name of *elko*, and I took a similar female in Idaho, on the line of the Northern Pacific Railway. Of what has been described as *pamphiloides*, by Reakirt, I have no authentic specimens, but Strecker states, in a foot-note (*Streck., Cat.*, p. 100), that he possesses the original type, which in no way differs from *pamphilus*, though, as far as I am aware, nothing from America which could be mistaken for *pamphilus* has since been heard of. *Kodiak*, W. H. Edw., from Alaska, is probably a small Arctic form like *isis*. The most distinct

of all the American forms, and one which may possibly be a distinct species, is *californica*, Dbldy., which I have taken abundantly in May, on the dry foot-hills of Southern California, in the Yosemite Valley, at 3,000 feet, and in marshy forest meadows at Sissons, Oregon. What I believe to be the 2nd brood of *californica* is known as *eryngii*, H. Edw., and *brenda*, W. H. Edw., and differs in the much paler colour of the underside. As I have seen nothing intermediate between any of the Californian forms and those from the Northern Pacific coast and Rocky Mountains, it may be better to consider *californica* as a distinct species, but I can see no grounds for treating any of the other American forms as distinct from *tiphon*. The male genitalia of all these forms are alike, and do not differ from those of *C. tiphon*.

I had written the above notes on *Coenonympha tiphon* when Mr. J. Edwards (to whom I am indebted for the examination of the genitalia) called my attention to Dr. Buckell's paper in the *Entomologist's Record* for December, 1895. I have nothing to say with regard to his conclusions, except that *isis* is certainly more worthy of a name as a geographical variety than what he calls the British middle form, which in my own collection I am not able to separate. But I think his careful attempt to identify the British forms with the names given by Continental authors fails, because he had not sufficient foreign specimens, and I prefer to abide by the nomenclature of Staudinger's *Catalogue*, 1871, with the addition of the varieties which I have mentioned in my notes.

If my conclusions are accepted, the synonymy will stand as follows:—

Coenonympha tiphon, Rott. (so spelt by Staudinger. I am not able to refer to the original description). This name has two years priority over *darus* of Fabricius, which must therefore be treated as a synonym. Hab.: Northern, Central and Southern Germany, Sweden, Alps. Some English specimens (the middle form of Buckell) may be, perhaps, better grouped with this form, than with the typical Northern Scotch and ? Irish form. This I call

Var. et. ab. *laidion*, Bork., because it occurs, according to Staudinger, as an aberration in localities where *tiphon* is typical, just as *tiphon* may occur as an aberration where *laidion* is typical.

Var. et ab. *philoxenus*, Esp. = *rothliebi*, Stdgr., occurs apparently as a typical variety only in peat-bogs in England and North West Germany, but probably as an aberration elsewhere [*vide*, p. 237.—ED.].

Var. et ab. *isis*, Thunb.—Hab.: North Russia, Finland, Northern Scandinavia, Lapland, and parts of Siberia. As an aberration rarely in Britain, and probably elsewhere.

Var. *viluensis*, Mén.—Hab.: N. E. Siberia, on the Vilui river, and probably elsewhere.

? Var. *caeca*, Stdgr. (*Stett. Ent. Zeit.*, 1886, p. 251).—Hab.: Turkestan, S. Siberia.

? Var. *inornata*, W. H. Edw. = *ochracea*, W. H. Edw.—Hab.: Rocky Mountain States of U. S. America.

? Var. *ampelos*, W. H. Edw.—Hab.: Oregon, Washington, British Columbia.

? Var. *kodiak*, W. H. Edw.—Hab.: Alaska.

? Var. *californica*, Dbldy.—Hew. (= *brenda*).—Hab.: California, Oregon.

NERVURES.

By J. W. TUTT, F.E.S.

Neuration has now become a part of the work of all studious lepidopterists. Even the "man in the street," entomologically, has learned something about it. The influence which the study of neuration has had on recent systems of classification of lepidoptera is most marked.

Every student who takes up the study of entomology, without any previous biological training, mechanically follows his favourite author in matters of terminology. He may have installed this particular author in the first place for many reasons. Probably he has picked up more "localities" from his book; maybe, the figures in his book are good for naming by (and hence, discourage study). In short, he may be installed first favourite for any reason except the fact that he is scientific. The student observes that various authors have called the structures which make up the neuration—nervures, nerves and veins. He makes his own choice, usually without consideration, of these names, and is forthwith prepared to back his opinion.

Those entomologists who happen also to be biologists in the wider sense, have long drawn attention to the fact that the structures in an insect's wing, sometimes called "nerves" or "veins," bear no analogy to the structures known to anatomists by the same names. Hence they have very properly objected to the use of names, which already have well understood technical meanings, for structures bearing no relation to those known under these names.

Dr. Sharp states this position very clearly. He says:—"It has been shown by Hagen that the two layers (of membrane) can be separated when the wings are recently formed, and it is then seen that each layer is traversed by lines of harder matter, the nervures. These ribs are frequently called wing-veins, or nerves, but as they have no relation to the anatomical structures bearing those names, it is better to make use of the term nervures" ("Insecta," *Cambridge Natural History*, vol. vi., p. 107). Dr. Sharp's conclusion is the only one to which anyone who has had a biological training can possibly come, and appears, indeed, so self-evident, that the universal use of "nervures" for the structures that traverse the wings of insects, should, in future, be assured. The term defines the exact thing described, and does not clash with already existing terms.

Notes on Coleoptera.

A DAY AMONG THE DEAL SAND-HILLS.—THE BEETLES OF OLD COAST-LINES.

By CLAUDE MORLEY, F.E.S.

What coleopterist does not look back, with something approaching regret that the time is past, and can never be repeated with the same thrill of purely entomological pleasure, nay, excitement, to his first visit to the almost historical sand-hills between Deal and Sandwich, to that visit which undoubtedly marks a red-letter day, both in his mind and in his diary?

The remembrance I carry with me of my first approach to the unconscious sand-hills, armed *cap-à-pie*, with a somewhat superfluous

sweep-net, is very vivid. It was towards the end of April, and perhaps rather early in the season for the better coast species. Arrived at the sand-hills, the first thing that caught the eye was a dead specimen of *Heliopterus gibbus*, which afterwards occurred abundantly at the roots of the grass, by pulling up which the majority of the good things were taken, though loose sods and stones appeared to afford an equally secure and acceptable retreat to many of the *Geodephaga*. A pair of forceps proved quite capable of performing what little digging was necessary, though they were of but slight use for capturing the small species, as a grain of sand larger than the insect would often be carefully raised for examination, the coleopteron the while scuttling away with might and main to some approximate hiding place, wherein, if not previously detected, he would lie *perdu* till again disturbed by the all-ferreting forceps.

I shall not soon forget the exquisite pleasure of lying at full length upon the warm sand, with pockets, eyes, boots, and hair quickly absorbing its grains, beneath the genial and still novel warmth of the April sun, with pipe in mouth and collecting tube in hand, bottling species with which I had only previously become acquainted through the kindness of my correspondents and friends. The beetle I was especially desirous of obtaining was that essentially sand-hill species, *Hypera fasciculata*, but for some cause or other I failed to turn it up; perhaps the season was too young, though more probably I overlooked its food-plant, *Erodium maritimum*, the stork's bill, which grows almost exclusively, and somewhat rarely, on sandy sea coasts,* and which, at the time, I knew simply as "a kind of wild geranium." Carefully pulling up the maritime grass and sand-wort in handfuls, soon produced the desired effect; many species I had never seen alive before were abundant, such as *Harpalus serripes*, *Demetrius monostigma*, and *Otiorynchus atroapterus*. *Calathus mollis*, *flavipes*, *fuscus*, *cisteloides*, and *melanocephalus* fell out in great numbers, and the haste with which they essayed to regain their exalted hiding-places by traversing the sand was most ludicrous, as for every inch they progressed, the loose grains, upon which they could find no secure fulcrum, slipped back another.

Trachyploceus scabriculus, and similar small species, are so easily overlooked on account of the close resemblance they bear to their pabulum, that great circumspection is needed to detect them as they lie curled up into tiny balls of grey. *Coccinella 14-punctata*, on the contrary, which appears to be the sand-hill species of the genus *par excellence*, comes, a relieving flash of scarlet from among the roots of the capping sods of the pit. This was the only time I took *Onthophagus nuchicornis* at the roots of plants, whence several specimens came up with *Aegialia arenaria*, *Megacronus analis*, *Cnecorhinus geminatus*, and other common things. The searching of precarious stones in the immediate neighbourhood yielded many good species, such as *Harpalus serrus*, *rotundicollis*, *anrius* and *tardus*, *Amara fulva*, *Laeon murinus*, etc., and short grass, of which there was a little, was productive of a few *Phyllotreta lepidii*, commoner, however, at its roots. *Onthophagus nuchicornis* was also very abundant in *stercore*, with *Aphodius fimetarius*

* *Erodium maritimum* used to occur at Mansfield, Nottinghamshire, and is still to be found growing on the sand-hills of the ancient coast-line to the east of Lakenheath, in Suffolk, where I saw it in flower as recently as last September.—C.M.

and *putridus*, *Sphaeridium scarabaeoides* and *bipustulatus*, and would doubtless have been joined later by *Nitidula 4-pustulata*, and the maritime species of *Saprinus*.

A note or two upon other Coleoptera generally found in similar situations may not be out of place, while writing of the sand-hills. It is most interesting to notice that, although the sea is now nearly fifty miles away, familiar sea-side beetles continue to breed in the sand-hills which mark the erstwhile coast-line, at Brandon, in north-west Suffolk. Here *Brosicus cephalotes*, *Cneorhinus geminatus* and *Crypticus quisquilius* still flourish, and *Harpalus anxius*, some still immature, are common under stones in September. *Calathus fuscus*, *flavipes*, and *Amara fulva* are abundant; *Hypera fasciculata* occurs very sparingly beneath *Erodium*, and *Sitones griseus* may still occasionally be swept. The Eastern counties are very rich in what were once coast-lines, but from which the sea has long receded, and which it has left high and dry with their complement of *Cakile*, *Arenaria*, *Ononis*, and other plants that love a light soil. Here Curtis took *Microzoum tibiale*, at Southwold, in abundance, and many good things are continually met with.

Anthocomus fasciatus, which occurred to me on the sand-hills at Felixtowe this year, is a somewhat unlooked for species in such a situation, since its larva lives in the nests of certain species of *Crabro*, or solitary wasps, in their borings in old posts. At Southwold, *Cneorhinus exaratus*, *Olisthopus rotundatus*, and many other species are common on the cliffs, or rather at their base, which is remarkable from the fact that at high tide the sea washes quite up, rendering it impossible for one to pass along the shore, and the insects must consequently often become submerged, which proceeding, although natural enough in the economy of *Aepus*, and probably also of *Pogonus*, one hardly supposes is as congenial to the tastes of *Amara* and its confrères. Under a piece of stranded timber, probably part of the *débris* of some ill-fated ship on the beach, I once took *Helophorus rufosus*, congregated in great numbers, but the insects were difficult to distinguish from the small pebbles surrounding them; so abundant were they under this one piece of timber (the only one of the kind, unfortunately), that I secured some sixty specimens in half an hour or so, at the above locality. Near Kessingland, and in most sandy places, *Apion ononis* is abundant upon its particular pabulum, and *Cryptocephalus minutus* common on ragwort flowers. A very great number of species might be enumerated, either especially addicted to sand-hills and their vicinity, or occurring there in greater numbers than elsewhere, but the above will show that the most barren places, in the usual acceptance of the term, are often rich in insect fauna.

On a small collection of Lepidoptera made in the neighbourhood of Aix-les-Bains.

By J. W. TUTT, F.E.S.,

I have before described the locality of Grésy-sur-Aix, in *Ent. Rec.*, vol. v., pp. 169-172. On that occasion I spent a few days there towards the end of August. This year I was a month earlier, and spent the two days, July 25th and 26th, collecting there. The

following are the meagre notes I was able to collect with regard to the insects observed.

HESPERIDES.—*Syrichthus sao*.—Occurred sparingly; specimens captured whilst sucking moisture from the roadway. *Nisoniades tages*.—A single specimen only, of the ab. *unicolor*. Evidently belonged to a second brood. *Pamphila sylvarum*.—Several worn specimens observed.

PAPILIONIDES.—*Everes argiades*.—A few specimens observed in a clover field, flying about much as *P. icarus* does. Although of the second brood, these were not of the larger size usually ascribed to the summer seasonal form, *amytas*. *Noniades semiargus*.—Flying about with *P. icarus* and *P. corydon*, on wild sainfoin flowers. The ♀ large and dark. *Polyommatus astrarche*.—Not uncommon, with orange marginal spots on the margins of upper side of all wings. *P. icarus*.—Common. *P. corydon*.—Common. The undersides of the males very white. *Chrysophaeus dorilis*.—Just appearing; a single male, in fine condition, was the only specimen captured. *Papilio podalirius*.—Everywhere, but not in great numbers. Most abundant at the puddles made by the water-carts in the town. Also common in clover fields at Grézy, resting on the flowers. *Pieris rapae*.—Abundant; a large form with indistinct black markings. *Leucophasia sinapis*.—Abundant. The females busy ovipositing. This was, of course, a second brood. The males were not unlike those of the first brood in England, in having a square apical spot, but with whiter ground-colour (thus resembling the second brood). Some ab. *diniensis*, however, were observed, and most of the females were of the ab. *erysimi*. *Colias hyale*.—Abundant, but difficult to catch, as usual. The ab. *obsoleta* and ab. *intermedia* were observed. *Gonopteryx rhamni*.—In marvellous abundance. The females chiefly of the form known as ab. *intermedia*. *Polygonia c-album*.—Several specimens flying about the hop-plants covering the front of a small inn, near the Lac Bourget. These were worn, and of the ab. *pallidior*. *Limnitis camilla*.—One or two only observed. These were large, and more like the specimens from St. Michel-de-Maurienne, and not like the small specimens that I have obtained at Courmayeur, Aosta, Bourg d'Oisans, and other localities. *Melitaea cinxia*.—The second brood well out, and in fine condition, in a rough pasture. Rather smaller than British specimens. *Melitaea athalia*.—Second brood just going over. The species was found sparingly in the wood clearings, settled on flowers. The females in much better condition than the males. *Melitaea didyma*.—Not uncommon. Some specimens in good condition. *Pararge megera*.—Second brood just appearing. The underside approached the ab. *lyssa*. *Hipparchia hermione*.—Persisted in settling on the trunks of some tall trees, quite out of reach of the net. *Hipparchia briseis*.—Just appearing, one or two only. These, when settled on the white (limestone) paths, were most difficult to see. *Hipparchia semele*.—The underside exquisitely marbled. The females of marked var. *aristaeus* form. *Satyrus dryas*.—Two only seen, both worn. In spite of this, it was evident that the species was not properly out. (It was seen in abundance here in 1894, a month later). *Epinephreus lycaon*.—Just coming out. A great many specimens in the lane leading up to the woods. No males were observed with two ocellated spots on fore-wings. *Epinephreus ianira*.—Abundant, and getting worn. The females pale, the undersides grey. *Epinephreus* (?) *Coenonympha* *tithonus*.—Common

with the two foregoing, and in fine condition. *Coenonympha arcania*.—Large, typical form. Some specimens flying along the paths and over the brambles and bushes in the same way as *E. tithonus*, which they resembled very closely. I also saw the females in a rough grass field ovipositing. The latter were in much poorer condition than the former. *Enodia hyperanthus*.—Common on the roadside between Grésy and Aix-les-Bains, but *passé*. The females were remarkably well ocellated. *Melanargia galathea*.—In great abundance, but quite *passé*. I do not think I saw a really good specimen.

BOMBYCIDES.—*Porthetria dispar*.—In untold profusion. The males were everywhere, flying madly over the bushes, or zigzagging in the lanes with *E. lycaon* and *E. ianira*. No females seen. *Euthemonia russula*.—Second brood just appearing.

GEOMETRIDES.—*Acidalia rufaria* and *A. ochrata*.—I should be inclined to refer the males of a species captured among the sainfoin to the former, and the females to the latter species. I see the two species have been telescoped at the British Museum. Yet even in the long series there, I find no specimens just like mine, and am not at all satisfied yet that the two sexes of my moths do not belong to two species. *Acidalia moniliata*.—Going over, only one or two specimens observed. *Acidalia humiliata*.—Not uncommon, but too worn to be worth collecting.—*Asthena candidata*.—A few specimens of a second brood occurred. *Eubolia bipunctaria*.—A somewhat dark grey form was not uncommon. *Gnophos furrata*.—Several specimens of a huge Gnophid were disturbed, and one captured. I am not at all certain it is this species, as it is very different from our dark Mendel Pass specimens of *G. furrata*. This was in poor condition, and very pale.

NOCTUIDES.—*Euclidia glyphica*.—A form with rather dull-coloured fore-wings and somewhat suffused hind-wings was observed. *Acontia luctuosa*.—A few specimens noticed in a stubble field.

PTEROPHORIDES.—*Acipitilia tetradactyla* was the only plume observed.

PYRALIDES.—*Botys rubiginosalis*.—This was abundant on the sides of the pathway leading through the wood. *Botys fuscalis*.—Common in the same locality as the last. *Endotricha flammealis*.—A few specimens disturbed from the undergrowth. *Crambus falsellus*.—A pretty pale form, with very white ground colour, was abundant in the same locality as the last.

TINEIDES.—*Pleurota schlaegerella*.—Not at all uncommon among the junipers.

ZYGENIDES.—These were in full force, and here and there were in countless profusion, all the species mentioned sometimes occurring on the same flowery bank. I saw no cross pairing. *Zygaena carniolica*.—Very abundant, and very variable. The following aberrations were taken, *viz.*—(1) *ab. diniensis*, found commonly here, (2) *ab. hedyari*, not uncommon, (3) *ab. intermedia*, not common, (4) *ab. berlinensis*. This last aberration, with *ab. diniensis*, made up the bulk of the captured specimens. The fully cream-ringed type was rather rare, and on the whole, the specimens incline to be devoid of this characteristic marking of the type. As a race, therefore, the Aix specimens tend towards a form with the red markings not strongly ringed with ochreous. There is also a strong tendency for the two red basal and the two red central spots to coalesce. *Zygaena achilleae*.—Common, but showing no marked variation. *Zygaena transalpina*.—Not common, and not

exhibiting any variation. *Zygæna jilipendulæ*.—Of fair size, but not differing from British examples. This was the rarest species of the five common ones. *Zygæna loniceræ*.—Of large size and common, but showing no variation. One five- and one six-spotted species with red abdominal rings have not yet been determined.

It must be borne in mind that these captures were all made in two mornings. The most I could do was to sample the insects met with, as my space was limited. Many small species, therefore, were probably overlooked, and many others not differing from our British examples were discarded. These latter, of course, are not included in the above, as I bear only the faintest recollection of them.

SCIENTIFIC NOTES AND OBSERVATIONS.

AFFINITIES OF *EPINEPHELE TITHONUS*.—An observation that I made on the habits of *Coenonympha arcania*, in the woods at Grésy-sur-Aix at the end of July last, leads me to ask for the gift or loan of an egg, larva and pupa of *E. tithonus*. This observation was simply that *C. arcania* has exactly the same habits on the wing as *E. tithonus*, and that I carelessly netted three or four specimens of the former under the impression that they were of the latter species. In my recent rearrangement of these species (*British Butterflies*, p. 376) I included *E. tithonus* in the same genus as *E. ianira*, with some amount of doubt, which that casual observation made at Grésy increased. I have since examined the ocellated spots critically, and am inclined to think that *tithonus* is much nearer the genus *Coenonympha* than that of *Epinephele*. I should be glad of pupæ and larvæ whenever obtainable, for description, and to confirm or correct this view. I observe that Dr. Jordan made an identical observation (*E.M.M.*, xvi., p. 89) on the similarity of habit between *C. arcania* and *E. tithonus*.—J. W. TUTT.

ON THE COLOUR OF THE COCOONS OF *SATURNIA PYRI*.—I was interested in your remarks (*ante*, pp. 195–6) about the cocoons of *S. pyri*. Those I found outside are both darker and harder than those which spun in my possession. The larvæ seem to me to spin a light-coloured cocoon, and then to consolidate it by secreting a dark fluid, which “felts” the silk. The larva, which pupated in a paper “poke” at Bourg d’Oisans, is not only lighter, but not so hard, as the others.—E. HARRISON, Rosetta, Peebles.

NUMBER OF EGGS LAID BY *DASYCHIRA PUDIBUNDA*.—A female *Dasychira pudibunda*, which I took *in cop.* on a beech-trunk at 7 p.m. on the 14th May, had laid 274 eggs by 5.10 p.m. the following day. I counted these three times to ensure accuracy.—WILLIAM HEWETT, Howard Street, York.

PORTHETRIA DISPAR AT LIGHT.—I omitted in my note on the habits of this species (*ante*, pp. 208–209) to mention that the males came freely to the lighted windows of the hotel where I was staying, at Bourg d’Oisans, from about 8 p.m. to 9 p.m. No females were attracted.—J. W. TUTT.

QUERIES AS TO *TEPHROSIA BISTORTATA* (CREPUSCULARIA) AND *T. CREPUSCULARIA* (BIUNDULARIA).—As I am working at these species, I should be glad of information from as many entomologists as possible *re* the following questions:—(1). The earliest and latest dates on which they have taken either of these species? (2). When they consider each species to be in its prime? (3). Is *T. biundularia* ever double-brooded with

them, or even partially so? (4). Do two broods of *T. crepuscularia* occur, and, if so, what is the usual date for the second brood to occur; and do the specimens of the second brood differ from the first in size, colour and markings? (5). Is there a melanic form of either species, and, if so, in what proportion does it occur to the type, and has the melanic form increased of late years? (6). Do both species ever occur at the same time and place, that is, do late specimens of *T. crepuscularia* ever occur with early specimens of *T. bimbularia*, and, if so, have they ever been known to pair, and were the hybrid eggs fertile or sterile? (7). Do intermediate aberrations occur which imperceptibly unite both species, or in each species in any of its forms readily distinguished from the other. (8). If both species have been bred, whether any difference was noticed in the colour or markings of the larvæ, and on what were they fed? (9). Have both forms remained distinct for a long period of time? (10). Are *T. bimbularia* and *T. crepuscularia* partial to any particular tree (or trees), and, if so, which? (11). At what height above the sea-level does either species occur, and what is the average temperature of the district? Information as to the geographical distribution of these species is much wanted, especially from Irish, Scotch and Welsh entomologists.—WILLIAM HEWETT, Howard Street, York. [We trust as many lepidopterists as possible will assist Mr. Hewett, as far as lies in their power, by giving answers to these questions, as he is preparing an exhaustive paper on this subject for publication in this magazine. — Ed.]

VARIATION.

SYRICHTHUS MALVÆ AB. TARAS.—On June 14th, near Wokingham, Berks, I had the pleasure of taking a very fine specimen of *Syrichthus malvæ* ab. *taras*. It was rather remarkable that it was the only specimen of that species seen on that day, in fact, the last I have seen.—A. H. HAMM, 24, Hatherley Road, Reading.

LOCAL RACES OF HYPsipETES SORDIDATA.—There is a wide difference in the forms of *H. sordidata* (*elutata*), found in Forres and Aviemore. The former resembles more our southern green form, but the latter is varied — red, brown and grey of different shades. Of course, Forres, lying low, is pastoral, a green country. At Aviemore you have every colour of environment, in the lichens, mosses, stones and trees. Given initial variation, with few selective agents, or little eliminating force, and a wide range of forms is preserved.—H. TUNALBY, F.E.S., Aviemore, Inverness-shire. Oct., 1896.

ABERRATION OF MELAMPAS EPIPHRON.—I captured a very pretty variety of *Melampus epiphron* this season. It is a dark male specimen, with a sharply defined very pale band on fore-wings, instead of the usual dark red band.—H. A. BEADLE, 6, Station Street, Keswick. October 19th, 1896.

COENONYMPHA TIPON VAR. PHILOXENUS IN SCOTLAND.—Whilst the subject of the variation of *Coenonympha tipon* is before the entomological public again, it may be well to remind entomologists that in Kirkcubrightshire (Cobend), Dr. Buchanan White found the English form, var. *philoxenus*, on Cloak Moss, in 1870 (*F.M.M.*, viii., p. 66). It may also be advisable to note that the distribution of the varieties of this species in the Scotch counties, south of the Clyde and Forth, is very imperfectly known.—J. W. TUTT,

NOTES ON LIFE-HISTORIES, LARVÆ, &c.

Changes in the colour of the Pupa of *Epinephele ianira* just previous to emergence, with some incidental observations on the Pupal structure.

By J. W. TUTT, F.E.S.

The typical pupa of *Epinephele ianira* is well-known, but the changes in its coloration previous to the emergence of the imago are probably not so well-known. The wings are perhaps always rather yellower than the rest of the pupa, which is of a delicate green. The following notes were made from a pupa sent to me towards the end of May, by Mr. Wolfe, of Skibbereen, co. Cork.

On June 8th, the green pupa of *E. ianira* had become largely yellow. *Dorsally*.—The central mesothoracic ridge is yellow, bifurcating into a double dorsal yellow line, terminating at the cremaster. The incisions of the segments are greenish. A pair of red-brown tubercular dots are conspicuous at the back of each segment. *Laterally*.—The wings are yellow (very pale), with a raised ridge along the inner margin, edged (dorsally) with brown. Another brown line runs from the base to the centre of the outer margin of the wing; a short brown line lies near the apex. *Ventrally*.—The nose-horns are very pale; the tongue and legs yellow; the antennæ, slightly orange. The abdominal segments green. The tongue extends slightly beyond the antennæ and the tip of the wings. The antennæ do not quite reach the tips of wings. The larval skin is attached to the cremaster, the larval head lying on the ventral part of the 6th abdominal segment of the pupa.

On the morning of June 9th (9 a.m.), the wings and legs had become somewhat orange tinted, the antennæ were of a somewhat deeper orange hue. The dorsal area and abdominal segments were greenish-yellow.

On June 10th (9 a.m.), the wings were of a deeper orange hue, with a strong tinge of brown about the basal area and towards the apex of the wing. There was also a slight trace of the apical ocellated spot.

On June 11th (9 a.m.), the pupa was entirely black. The head, wings, thorax and abdomen thinly dusted with white as with flour. The pupal skin, especially that of the legs, antennæ and maxillæ evidently transparent. The dark colour of the imaginal wings, the orange blotch and pupilled spot, all distinctly visible through the pupal skin. The three dark streaks belonging to the pupa, *viz.*, (1) along the dorsal edge of the ridge along the inner margin of the wing, (2) the longitudinal streak across the centre of the wing, (3) the short streak near the apex all dark, and without the dusted appearance the remaining skin of the pupa has. The dark colour of the pupa at this stage shows up a number of white spots on the skin of the pupa, of which the two rows representing the anterior and posterior trapezoidals are very conspicuous, the former, at the front of each segment and not far removed on either side from the medio-dorsal line, the latter, at the back of the segment, and further separated than the anterior. The anterior trapezoidals are not visible until the imaginal coloration approaches maturity. The movable incision between the abdominal segments 4 and 5, is stretched considerably just before

emergence, that between 5 and 6 much less so. The imago emerged some time during the day (June 11th).

LENGTH OF LARVAL LIFE OF *EMYDIA CRIBRUM*.—It may be of interest to you to know that some *Emydia cribrum* larvæ, which I took last Easter, three parts fed, are still feeding. One pupated a week ago.—W. G. HOOKER, Claremont, Alington Road, Bournemouth. September 23rd, 1896.

EGG OF *EPUNDA LICHENEÆ*.—Eggs laid closely side by side, but not overlapping. Somewhat globular in shape (depressed sphere), and pale yellowish in colour; the more advanced eggs with a broad dull orange band round the centre, and a dull circular patch at the apex. About 36 well-developed transverse ribs running from micropyle to base. Under a one-sixth lens the ridges stand out as distinct bead-like bands, each adjacent pair becoming united towards the apex of the egg, so that only about one-half the number of ribs passes over the top into the micropylar depression. Faintly marked transverse ribs unite the raised points of the longitudinal ridges. The micropyle is exceedingly small, forming a tiny rosette of minute cells at the base of the micropylar depression. A dark point is in the centre of the micropyle. Egg described September 16th. Eggs hatched October 6th. I am indebted to Dr. Chapman for the eggs.—J. W. TUTT.

EGG OF *EPUNDA NIGRA*.—The eggs laid closely side by side, without overlapping. Under a two-thirds lens they appear smaller than those of *E. licheneæ*. In shape, a depressed cone, the base to height as about 3 : 2, so that the broad base narrows rapidly to micropylar depression at the top. Colour of the egg, purplish, its upper half dull orange below (a more advanced egg looks blacker). Ribbed longitudinally from apex to base, with transparent shiny ribs, the latter glassy-white and shiny. The micropylar depression distinctly marked at apex, the micropyle forming a raised central rosette of minute cells at the bottom of the depression. Under a one-sixth lens, the colour resolves itself distinctly into a yellowish basal area, with purple patches, and a purplish upper area. There appear to be about 12 ribs passing over from the sides into the micropylar area, and these are continued down the sloping sides of the micropylar depression. These 12 ribs are formed from a much larger number, which, running up from the base towards the apex of the egg, unite in couples before they reach the rim of the micropylar area, and then again in couples as they go over the rim, thus making a total of about 48 ribs, starting from the base. These longitudinal ribs are raised bead-like ridges, with transverse sculpture running between them. The egg-shell itself is perfectly transparent. The larva eats its way out at the upper edge of the egg, directly below the micropyle, which is not disturbed or injured by the operation. I am indebted to Mr. Tunaley for the eggs. He informs me that they were pale yellow when first laid. The eggs were described on October 4th, and one larva hatched the same day.—J. W. TUTT.

EGG OF *PAMPHILA COMMA*.—Attached by base, which is somewhat flattened. In shape it is a truncated cone, white in colour, with a conspicuous slaty-coloured, basin-shaped, micropylar depression. The shell, under a two-third lens, apparently smooth; under a one-sixth lens, minutely pitted; the micropylar depression is edged with similar

pitted cells, whilst at the bottom of the depression the micropyle is seen in the form of a tiny, raised, conical point. An ochreous shade in the coloration of the sides suggests that the embryo is already well formed, although the larva will not, if Buckler's observation be correct, hatch until next spring. Eggs described September 16th. I am indebted to Mr. Hamm for the eggs.—J. W. TUTT.

NOTES ON THE LIFE-HISTORY OF *PAPILIO MACHAON*.—The ova were found by Mr. F. B. Harvey, on wild carrot, at Ranworth Marshes, June 26th, 1896.

Description of egg.—Half sphere in shape, dull reddish when found, turned afterwards to a dark livid hue. Hatched June 30th.

Larva, 1st skin.—Length about $\frac{1}{5}$ of an inch. A short square-ended larva with a large black shiny head; in superficial appearance very similar to a young *Liparid*. *Head*.—Large, black, shiny, rather square, notched at crown, with stiff black scattered hairs. *Body*.—Black, except on dorsal area of the abdominal segments 3 and 4, where the light cream patch (which makes the larva so closely resemble a bird's dropping) is beginning to show. The scutellum large and chitinous looking; segments, very distinct. Body tapers towards anus, and ends abruptly. Anterior trapezoidals large, bearing only one hair. The posterior trapezoidals are immense, tall and fleshy, bearing numerous long stiff black hairs, nearly half the thickness of body in length. At tip of hairs there is what appears to be a knob of viscosus paste, or drop of liquid. The (?) posterior trapezoidals on the pro-thoracic segment show up very plainly, though perhaps not much larger than the rest, this still further heightens its *Liparid* appearance, and, though the position of these tubercles is not the same as the ear tubercles of *Liparis*, still the superficial resemblance is remarkable. The height of the posterior trapezoidals is nearly, if not quite, one-fifth of the thickness of the body. The folds of skin between the head and the scutellum are pale grey, and show up clearly when the larva moves its head. The *osmaterium* is present in the first skin, and appears very long in proportion to the size of the larva. It is of a pale straw-colour.

July 5th, *2nd Skin*.—The body is not so flat, still rather short and stumpy. *Head*.—As before, about same size as pro-thorax, or slightly smaller. *Body*.—The meso- and meta-thorax, and the abdominal segments 1 and 2 are larger than the other segments, the meso-thorax being the largest of all. The body tapers towards anus. The colour, velvety black, with white patch on dorsum of 3rd and 4th abdominal segments. This patch is divided into two by traces of a black medio-dorsal line. (?) Anterior trapezoidals on thoracic segments bear several hairs, but on abdominal segments only one. On the 1st abdominal they are nearly as large as on the thoracic. The posterior trapezoidals are tall, conical and fleshy looking, they bear several small hairs. The lateral tubercles are: the supra-spiracular, the post- or pre- and sub-spiracular, the latter being very close together. Numbers of secondary hairs are now present on body. All hairs appear moist at tip, or slightly knobbed. By 9th July the larva was about to undergo second moult.

I was so busy after this date that I was unable to continue the notes on this species, but as far as memory serves me the larvæ pupated after the 4th moult. The resemblance of the young larva to

a bird's dropping is very perfect. When searching for larvæ on the Fen, I picked up a carrot leaf with what I took to be a young larva on it, but which proved, on closer examination, to be the excrement of some small bird.—A. BACOT. *October 1st, 1896.*

THE REARING OF *POLIA XANTHOMISTA* VAR. *NIGROCINCTA*.—Last winter there was an account in *The Record* describing how to rear *P. var. nigrocincta* from the egg. I obtained some eggs, and did my best with them, but was unsuccessful. I daresay other people have been rearing the same species during the summer, as the eggs were a good deal advertised. Would some of the successful people tell us how their success is obtained? My experience with these larvæ was that they would eat groundsel freely, and other things too, but after the first week or two, I kept them upon the flowers of garden thrift. They were very healthy until full-fed, when they all died off gradually. The larva very much resembles that of *P. chi* in colour, until the last moult, when it changes from green to brown, and the lateral white stripe becomes much less distinct. It also resembles it in shape and attitude. The larvæ seem to be minus the two front pair of claspers or prolegs until nearly half-grown. This causes the young larvæ to "loop" a great deal as they travel.—W. M. CHRISTY, M.A., F.E.S., Watergate, Emsworth, Hants. *September 22nd, 1896.*

PRACTICAL HINTS.

Field Work for November.

By J. W. TUTT, F.E.S.

1.—During the winter, stacks of heath, turf and bracken should be beaten for hibernating *Depressarias* and other moths.

2.—Pupæ of *Eupithecia frarinata* are to be found under loose bark and moss, on the trunks of ash trees, all through the winter.

3.—During the winter the pupæ of *Panolis piniperda* are to be found under the last year's layer of needles and moss. Roll back the carpet-like layer, and the pupæ are usually found at about the distance of a foot from the tree.

4.—The larvæ of *Semasia obscurana* (*gallicolana*) live through the winter in the old dried oak-apples fixed on the twigs of young oaks. The oak-apples should be collected in winter and early spring.

5.—To keep eggs through the winter in a natural state of dampness, "I get a clean smooth piece of that velvety moss which grows on old walls and cottage roofs, and, having carefully sprinkled the eggs over it, place it in a flower-pot, together with the food-plant; as the eggs sink into the moss, they cannot get shifted about; and, moreover, the moss will not entangle the legs of the newly-hatched larvæ. Of course the moss should be growing" (J. Hellins).

6.—The first specimens of *Carpocapsa nimba* obtained in this country were "bred by Lord Walsingham, from larvæ found hibernating in cocoons under moss on beech trunks, in Buckinghamshire" (Barrett).

NOTES ON COLLECTING, Etc.

Notes from East Devon.

By W. S. RIDING, B.A., M.D., F.E.S.

When Mr. Tutt wrote to me, a few weeks ago, to ask if I would send him some account of our season in East Devon, I felt inclined to

reply in the words of the knife-grinder, "Story, God bless you! I have none to tell, sir," for this has been the worst year, from a lepidopterist's point of view, since I settled down in the south-west; but, perhaps, I may manage to string together a few desultory recollections as a substitute.

Thanks to the kindness of Mr. Wm. Hewett, who sent me a large number of the eggs of *Callimorpha hera*, that he obtained from Starcross last autumn, I have been able to watch the life-history of that species. I found the most trying times were about the first moult, when I lost 10%, and again at pupation, when a considerable number failed to perfect their changes. I reared about 40%, and only two of these were crippled. I did not find the larvæ cannibals, as some say, and kept as many as 25 together in 8-inch pots. It is true, some three or four disappeared at the first moult without my finding any traces, but that might easily occur with such small objects whilst changing food. I fed them at first on forget-me-not (*Myosotis*) and raspberry, and when these began to fail, I gave strawberry and purple dead-nettle. My larvæ refused ground-ivy, and, when young, dandelion; so about Christmas I tried them with groundsel, which they ate eagerly. Later on, I gave dandelion again, and relishing it, they kept feeding on both till full-grown. Those that pupated successfully, did so between April 11th and 20th; the majority of the remainder spun a slight cocoon, and then shrivelled up inside, whilst some could not even manage the spinning. I suppose they were weakly ones, that had not enough vital energy to complete their changes, but think, too, that some may have been those I unavoidably disturbed in giving fresh food just as they had settled down in snug corners, and that the extra work entailed was the straw that turned the scale. They had an uncomfortable way with them, of getting just under the rim of the pot, between the muslin and elastic, and so had to find new quarters and begin spinning over again. All those that pupated, spun up above ground, in moss and bits of blotting-paper and food-plant, generally with one side of the cocoon on the earth, particles of which were there freely mixed with the web. None pupated underground, though I gave them a good depth of earth, as advised by some breeders. I tried to pair a couple, and kept them for three days in a large band-box with muslin top and sides and a plant of groundsel, but, finding at the end of that time, the arrangement had not been successful, I killed both, as, contrary to the usual experience, they were scarcely at all damaged.

I hear that *ab. lutescens* has been unusually abundant this year at Starcross. I bred five of that form, and several with orange secondaries (= *ab. saturnina*, Oberth.). The perfect insects emerged between June 16th and 28th, generally between 8 a.m. and 3 p.m.

Towards the end of May, when hedge-working and dusking ought to have been profitable, I did little but cover myself and my net with a general stickiness, for Aphides reigned supreme. Trees, high and low; shrubs, great and small; plants and climbers of all kinds were at their mercy; and many of the weaklings had their growth stunted for the year by the insects sucking the juices of the growing shoots. Food for larvæ, for the most part, had to be washed, for it was difficult to find leaves not infested; oaks, beeches, elms, sycamores, wild cherry trees were especially damaged, and one nut bush in the garden, that I keep constantly cut low, and has unusually large leaves, might have been

varnished. When searching for insects on the honey-dew, this bush seemed a favourite, and most nights I could find many of the common garden moths enjoying its sweets. Another, and a greater favourite still, was a silver fir—*Picea pinsapo*—which, for a couple of months or more, was the great attraction for *Agrotis exclamatoris*, *Triphaena pronuba*, *Leucania pallens*, and *Apamea didyma*, besides many common Geometers and Micros. At first I thought there must be some exudation from the tree, but failed to find any, and though I could not satisfy myself with traces of the plant-lice, I can attribute its attractiveness to nothing else. It was not flowering—its leaves, which form a sort of *cherane de frise*, made it very difficult to work, but gave great shelter to insects whilst feeding. By day, bees, wasps and flies revelled on it, as they do on ivy in full bloom. No wonder sugar was a failure! In July, I could only find three *Calymnia pyralina* to box off it, and, searching honey-dewed leaves, I found none, though records say it has been taken in considerable numbers by their means. Two other worn males came to light. *Hyphenodes albistrigalis* was fairly abundant, though few came to sugar, but by dusk towards the end of June (somewhat earlier than last year), I was able to take a larger proportion in good condition. I kept a good many for eggs, but none were laid, most of the insects dying very soon in confinement. In August, I again noticed a large batch of eggs of *Triphaena pronuba*, on the meshes of a boundary tennis net, as recorded in 1895. This must be a protective arrangement, to save the massacre of the innocents that takes place on low plants, though, if all the females lay at the same rate (700 to 800 eggs), it is scarcely one for which we should be grateful, as their larvæ are only too fond of garden produce.

Despite the drought, more prevalent in Devon and Cornwall than elsewhere, and the destruction of early pupæ, that must have occurred from want of moisture and inability to break through the iron-bound earth, my champion pupa-digger has brought in over 1,000 pupæ already, and though other boys seem only able to find a dozen or two now and then, there cannot be any great dearth this year. One would have expected larvæ to be abundant; the absence of rain and the warm weather ought to have been favourable to the young and their growth, barring any unusual multiplicity of enemies, but, if so, I have not been able to find them in any number. Just now, the constant heavy rains are playing havoc with our autumn species, and the last few mornings I have had to be contented with three or four larvæ of *Hypsipetes impluviata* and a few nondescripts, as the result of a couple of hours searching and beating the alders; from the salallows I can get nothing, though I know *Macaria alternata* and *Lobophora sexualis* breed on the spot.

How comparatively scentless flowers have been this year! A large bed of *Nicotiana affinis* is often scarcely perceptible of an evening, a few yards off; so no wonder few *Sphinx convolvuli* have been seen. My son has taken two, the first, in perfect condition, on August 31st, the second, somewhat worn, about a week ago, and since then it has been too wet to watch at dusk. He and I both noticed what shy insects they are, off in a moment if they hear voices, and, the other night, one hovering over the flowers, darted away on the church bells suddenly ringing, not to appear again, though there is no similar attraction within miles.

Light has proved a disappointment, too, and whenever I have found any considerable number of moths in the trap, it was the common *Crambites* that swelled the list; only one *Luperina cespitis*; both it and *Neuronía popularis* were late for us, being taken first at the end of August, and in as good condition as if bred. They did not seem to appear till the rains had thoroughly soaked and softened the ground. About a week ago I found two *Anchocelis lunosa* in the trap, a new record with me for these parts; they probably came from some hills right opposite, where, I believe, *Luperina cespitis* breeds. In spite of failure, I still keep lighting the lamp, in the hope, Micawber like, of something "turning-up."

Heath insects seemed to find no sweetness in ling, nor the Scotch *Erica*, and the survivors of the drought were evidently determined not to run unnecessary risks by exposure.

CRYPTOCEPHALUS HYPOCHAERIDIS AT LAUTARET.—It may be interesting to note that this beautiful, but rather common, British beetle was abundant at Lautaret (August 1st–6th), at an elevation of some 8,000 feet. The species were found commonly *in copulá*, resting on the herbage, fully exposed to the sun.—J. W. TUTT.

ACHERONTIA ATROPOS NEAR YORK.—On the evening of the 13th inst., I captured a specimen of *Acherontia atropos* in good condition at Scotch Farm, Elrington, near York. I noticed it first when flying round the chimney stack at dusk, and it shortly afterwards flew near the ground, close to where I was standing, and then into an outhouse, where it was easily secured. Although a large area of land in the district is devoted to potato growing, I have not heard of larvæ being seen this year.—S. WALKER, 23, Portland Street, York. *September 21st, 1896.*

AUTUMNAL EMERGENCE OF ACHERONTIA ATROPOS.—With the exception, possibly, of the three winter months, it would not be difficult, perhaps, to establish a record for this insect for every week in the year; but yesterday, October 8th, the evening of an exceedingly rough, cold and miserable day, would not generally be thought conducive to the appearance of *A. atropos* on the wing, but so it was. About 8 p.m. I heard an extraordinary noise in one of my breeding cages, and, to my astonishment, found two *A. atropos* (♂ and ♀) flying madly about. They had only been to earth seven weeks, were in quite dry sand, without any moisture, and were in a very cool, cold, in fact, outhouse. I have a larva still feeding, and they are yet procurable in the fields. I believe these two would readily have paired, but, partly on the principle of a "bird in the hand, etc.," but chiefly because I could have done nothing with the resulting ova, if any, they are now on the setting boards.—W. BOND SMITH, Potton. *October, 1896.*

I see (*ante*, p. 193) reports as to the abundance of *Acherontia atropos* this year. I had 13 larvæ sent me from Lincolnshire some time ago, of which 9 have successfully pupated, and I have already bred 6 fine moths from them. All the moths squeaked readily, as did one of the pupæ, and a larva also made the sound which they have the power to produce.—L. S. BRADY, 580, Ecclesall Road, Sheffield. *October 8th, 1896.*

SUGAR IN YORKSHIRE.—Sugar seems to have been a failure this year in most places. My friend, Mr. Benj. Morley, and myself have done

very well, but we have had to leave the woods and go into the old green lanes. We were in Deffer Wood last night, and took *Orrhodia lipula*, *Dichonia aprilina*, *Miselia oryacanthæ*, *Anhocelis rufina*, *A. litura*, *O. raccinii*, and *Brotolomia meticulosa*. It was the best night we have had in a wood the whole season.—FRED. LAWTON, Common End, Skelmanthorpe, nr. Huddersfield. *September 21st, 1896.*

NOTES ON *APION LÆVIGATUM*.—I have read, with considerable interest, Mr. Morley's article on the genus *Apion* in the October number of the *Entomologist's Record*, and would like to add the following note on the rare species, *lævigatum*, Kirby. The first specimen, a female, was taken by Rev. Mr. Kirby, at Barham, in Suffolk, many many years ago, and was in his collection; and the second, a male, by myself, in a field at Birchwood Corner, about 50 years ago. I afterwards (same year) took 7 or 8 specimens of both sexes, in the same field, when accompanied by Messrs. Walton, Waterhouse and F. Smith. Altogether about 18 specimens were captured. The field, the following year, was ploughed up, and *lævigatum* has not been taken since. We took them early in September, by sweeping; the herbage was very mixed, and we could not find the plant it frequented.—SAMUEL STEVENS, F.L.S., F.E.S., Loanda, 61, Beulah Hill, Norwood. *October 11th, 1896.*

DEILEPHILA CELERIO AT CHELTENHAM.—I took a fairly good specimen of *Deilephila celerio* on September 24th, at rest on the stable wall here.—(Major) R. B. ROBERTSON, Wellington Court, Cheltenham. *October 10th, 1896.*

BOLETOBIA FULIGINARIA AT HULL.—The enclosed specimen, which I believe to be *Boletobia fuliginaria*, was obtained at light in Earle's shipyard, in Hull, about three weeks since. It was given to Mr. Russell, who has recently gone to South Africa, and has left the insect in my care for the present.—J. W. BOULT, 9, Finsbury Grove, Fountain Road, Hull. *October 1st, 1896.*

CURRENT NOTES.

The second part of the sale of Mr. C. A. Briggs' collection will take place on November 10th, when the magnificent series of *Eudoridæ*, in 29 lots; the "Plumes," including Mr. Vaughan's extraordinary variety of *Oxyptilus parridactylus*; the CRAMBIDES, including three *Crambus rerellus*, *C. myellus*, *C. rorellus*, *Ephestia pryerella*, *Cateremna terebrella*, *Nephopteryx rhenella*, etc.; and a few TINEIDES, including fine series of *Solenobia triquetrella*, *S. inconspicuellæ*, *Psychoides rerhuelletæ*, *Eracretia allisella*, etc., will be disposed of.

Mr. R. A. Cooley describes (and figures) in *Psyche*, vol. vii., pp. 395-398, "a new structural character in insects." It is a small oval patch of short sharp spines on the underside of the fore-wing near the base of the hind margin. It is present on very many Heterocera, and is accompanied by a corresponding patch on the thorax at the place where the spines rest when the wings are in repose. It is an interesting fact that some Trichoptera possess similar spiny structures, and that in the Hymenoptera the spiny area has been found in two species, *Tremex columba* and *Urocerus cressoni*; in these latter, the patch on the wings bears a close resemblance to that of the Heterocera, except that the spines are more blunt. They are found in both sexes, and hence

Mr. Cooley does not believe that they are for sexual attraction. He considers that they serve to hold the wings in place when at rest, thus allowing a relaxation of the muscles of the wings.

Dr. Dyar considers that the structure in *Dionychopus nireus* (related to *Spilosoma*), which made the chirping noise described by Dr. Donitz in the *Berliner Ent. Zeitschrift*, vol. xxxi., was not that described by Mr. Cooley above, but was made by a semi-circular bladder-like structure, about 3mm. long, with a series of fine curved teeth along its straight front edge. It is placed on the anterior edge of the meta-thorax, directly below the hind-wing, on which, near the base of the cubital nervure, is a rounded, pointed chitinated knob, which may serve for rasping on these teeth.

Dr. Nagel describes (*Biol. Centralb.*, xvi., 1896, 51-57 and 103-112) the method of feeding in larvæ of *Dytiscus*. In these larvæ, the mouth is very much reduced in size, and the ingestion of food is performed by means of suction through the much modified mandibles, the process being facilitated by the powerful digestive action of the saliva, which has a marked poisonous action, killing other insects and even tadpoles, twice the size of the attacking larvæ, very rapidly. The larvæ not only suck the blood of their victims, but absorb the proteid substances. Drops of salivary juice seem to paralyse the victim, and to ferment the proteids. Similar extra-oral digestion seems to occur in larvæ of ant-lions and spiders, and according to Krause, in Cephalopods.

In *The Annals of Scottish Natural History* for July, 1896, is a list of the Hymenoptera and Hemiptera, collected by Mr. W. S. Bruce on the summit of Ben Nevis.

SOCIETIES.

THE CITY OF LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—October 6th, 1896.—*SIREX JUVENCUS* AT ELTHAM.—Mr. J. A. Clark exhibited a specimen of *S. juvencus*, captured the preceding day (Oct. 5th), at Eltham. Dr. Sequoira remarked that he had taken it some years ago in the month of August, in the Warren, at Exmouth. SECOND BROOD OF *HEMEROPHILA ABRUPTARIA*.—Mr. J. A. Clark exhibited a specimen of a partial second brood of *Hemerophila abruptaria*, that had emerged a few hours before the meeting. He had, up to the present, bred five specimens out of about 30 pupæ. *BOLETOBIA FULIGINARIA*.—Mr. Tutt exhibited a specimen of *B. fuliginaria*, which had been sent to him to name by Mr. Boulton, and which that gentleman stated had been captured just previously at Hull. It was noticed by the members that the insect was loose on its pin, and appeared to have been re-set. *CALLIMORPHA DOMINULA* AB. ROSSICA, KOL.—Mr. H. May exhibited bred specimens of *Callimorpha dominula*, the larvæ having come from Deal and Plymouth. Two had the hind-wings somewhat suffused (approaching ab. *persona*), and one had orange-coloured hind-wings. The latter was dwarfed and somewhat crippled. INTERMEDIATE *DRYAS PAPHIA-VALESINA* AND AN ABERRATION OF *D. PAPHIA*.—Mr. Bayne exhibited a ♂ aberration of *D. paphia*, with the spots joined so as to form longitudinal streaks crossing the wing, and with the black spots at the end of the nervures much enlarged. He also exhibited a grand ♀ *paphia*, much suffused with the *valesina* tint, and which Mr. Tutt remarked reminded him of

Dryas pandora. Also typical ab. *ralesina*, and one very dark one, suffused with tawny. All were captured in the New Forest. *APOROPHYLA AUSTRALIS* AB. *INGENUA*.—Mr. Prout exhibited two specimens of this aberration from Sandown, one taken in 1895 and one in 1896, and drew attention to its great rarity, both here and on the Continent. Mr. Tutt drew attention to the close superficial resemblance between this aberration and *Epnuda lutulenta*. DARK ABERRATIONS OF *TEPIROSIA BISTORTATA* (*CREPUSCULARIA*).—Mr. Prout exhibited, on behalf of Major Robertson, some dark aberrations of *T. bistortata*, and one specimen of the second brood, also one specimen of the extreme melanic form of *T. crepuscularia*, and drew attention to the fact that the dark aberrations of *T. bistortata* always showed a strong brown tendency, whilst those of the allied species, *T. crepuscularia* (*biundularia*) were black. He also drew attention to the remarkable statement, made recently by Mr. C. G. Barrett, that the second brood of *T. bistortata* was obviously *T. crepuscularia*. This view, he said, was quite untenable. Mr. Tutt agreed with the remarks made by Mr. Prout, and described the differences existing between the second brood of *T. bistortata* and *T. biundularia* (*crepuscularia*). Although the ground colour of both could be called "white," the dead-grey white (almost with a trace of lead-colour in it) of the second brood of *T. bistortata* was very different from the purer white (or creamy white) of the May-June species. *ZYGÆNA CARNIOLICA* FROM BOURG D'OISANS.—Mr. Tutt exhibited *Z. carniolica* from Bourg d'Oisans, and read the following notes:—"The type of this beautiful species has the red spots of the anterior wings surrounded with broad creamy-yellow rings, and the abdomen has a red ring surrounding it, but the insect is so variable that many aberrations have been named, a summary of which may be found in *Notes on the Zygaenidae*. These Bourg d'Oisans specimens are peculiar (1) in having scarcely any creamy rings to the red spots, and (2) in having the bodies entirely black = ab. *diniensis*, H.-S. Sometimes the first character is carried to the extreme, and no creamy rings are present at all. This form is the ab. *berolinensis* of Standinger. A combination of these two aberrations comprise almost 90 per cent. of the sum total of the specimens of this species observed at Bourg d'Oisans. I would also call attention to the union of the central and basal pairs of spots in many specimens." *CARSIA PALUDATA* AB. *IMBUTATA* AND *MELANIPPE MONTANATA*.—Mr. Oldham exhibited *Carsia paludata* ab. *imbutata*, from Manchester Mosses, and remarked on the gradual restriction of the mosses by drainage and cultivation. The *Melanippe montanata* were from Cambridgeshire, and some were very white, with very distinct bands. *TRIPHENA FIMBRIA* AB. *VIRESCENS*.—Mr. Heasler exhibited a specimen of *T. fimbria* ab. *virescens*, Tutt, from Wimbledon. In the New Forest, he said, it was generally looked upon as being very rare. Mr. Tutt thought it was a generally distributed form. VARIATION OF *EUPITHECIA SOBRINATA*.—Mr. Tutt exhibited a picked series of *Eupithecia sobrinata*, captured by Mr. and Mrs. Tunaley, at Aviemore. He said he believed the Scotch race as a whole was named var. *scotica*, by Dr. F. B. White, but the name was generally restricted to the pale variegated forms, which did not appear to occur in the South of England. The series showed that there was considerable variation among the Scotch specimens, the individuals arranging themselves into two parallel groups, one running through a series of brown forms, until the species

became almost unicolorous brown. The other through a series of grey forms, until they culminated in an almost unicolorous fuscous form. SCOTCH FORMS OF *EMMELESIA ERICETATA*.—Mr. Tutt then exhibited a series of *Emmelesia ericetata*, also captured by Mr. and Mrs. Tunaley, at Aviemore. These showed considerable variation:—(1) In depth of ground colour, some being much whiter, others greyer. (2) In the amount of ochreous tint. (3) In the width and completeness of the central band (forms with this central band broken just below the centre were very rare). ABERRATIONS OF *ABRAXAS GROSSULARIATA*.—Mr. C. May exhibited a marvellous series of aberrations of *A. grossulariata* (about 100 specimens). They had all been bred during the last two years under identical conditions, and showed every phase of variation, from being almost devoid of black markings to being exceedingly suffused, and almost entirely black. A few specimens had lost all trace of the yellow markings, and others were of the semi-transparent suffused character, so well-known to breeders of this species. Banded form of *HYBERNIA AURANTIARIA*.—Mr. May also exhibited a form of *H. aurantiaria*, with two dark bands very distinctly marked, owing to suffusion of the outer and basal areas. DARK ABERRATION OF *PLUSIA GAMMA*.—Mr. C. May then exhibited a very suffused aberration of *P. gamma*, the ground colour being of a dark reddish-brown. Mr. Tutt said that a similar aberration was described in *The British Noctuae and their Varieties* (vol. iv., p. 32). SECOND BROOD OF *ARCTIA CATA*.—Mr. Bate exhibited specimens of a second brood of *A. cata*, which had been bred from eggs laid in June last. The specimens had a tendency to assume a yellowish coloration in the hind-wings, due, perhaps, to the rapidity of feeding-up, and the rapidity with which they came to maturity. HAIRS OF *LEUCOMA SALICIS* AND *PSILURA MONACHA*.—Mr. Bacot exhibited drawings of the hairs of the larvæ (in first skin) of these species. *HELIOTHIS ARMIGERA* FROM IMPORTED TOMATOES.—Mr. Southey exhibited a long series of *H. armigera*, bred from larvæ obtained in North London, from tomatoes, which had been imported from Spain and Teneriffe. SECOND BROOD OF *ACIDALIA DILUTARIA* (*HOLOSERICATA*).—Mr. W. G. Pearce exhibited a living specimen of *A. holosericata*, bred from a Bristol larva which had come from an egg hatched last June. Mr. D. C. Bate read a paper "On the early stages of *Psilura monacha* and its allies." In the course of the discussion that followed, Mr. Bacot made the following remarks:— "The larvæ of *Psilura monacha* and *Porthetria dispar* develop within the egg before the winter. I examined same last January, and found the larvæ fully developed, even to the thorns and bulbs on the hairs. In the ova of *Orygia antiqua*, no apparent development had taken place until spring. In the 1ST SKIN OF THE LARVA OF *P. MONACHA*, the 3rd thoracic segment is weak, the tubercles on it smaller than in other segments (this feature is not present in *P. dispar*). The anterior trapezoidals very small, only bearing one hair; posterior pair very large, bearing numerous hairs (this is also the case with *P. dispar*, while with *L. salicis* it is questionable if the anterior pair are present, as I have, up to the present, been unable to find them). There are, at least, two distinct kinds of hairs present:—(1) Short spines, with slight traces of thorns, and a bulbous swelling, about $\frac{1}{3}$ up from base (the small hairs arising from anterior trapezoidals have this bulb). (2) Long and more slender hairs, many of them very thorny. The hairs in *P. dispar* are identical, but there is no trace of

the bulb on hairs of *Leucoma salicis*, or any other species that I have yet examined. They are present in *P. monacha* and *P. dispar* in the 1st skin only. The upper part of the bulbed hairs is frequently bent at a sharp angle, just above the bulb. IN THE 2ND SKIN, I noticed that the 5th abdominal segment is weak, both it and the 3rd thoracic are pale and have smaller tubercles than the other segments (this is not the case with *P. dispar*). IN 3RD SKIN, the head becomes grey mottled with black. The anterior trapezoidals still very small, but bearing five or six small hairs. IN THE 4TH SKIN, the tubercles and hairs smaller, in proportion to the size of the larva. IN THE 5TH SKIN, as in the fourth. I could trace no further moults in *P. monacha*, but I think *P. dispar* sometimes has a fifth moult. There is a tendency for the eversible and small glands on the abdominal segments, 1 to 4, to dwindle in the later stages of *P. monacha*, but this does not occur in *P. dispar*. LARVÆ OF *P. MONACHA* vary greatly in coloration. In one of my '94 broods (all from same parent) they varied from a form with a large amount of white in its coloration, to nearly black with hardly a trace of white. I consider that the larvæ when young are protected by their resemblance to a bird's dropping, and in later stages by their lichen-like coloration, the darker forms being difficult to detect, even on the smooth bare bark of cherry twigs from a London garden. PORTHESIA SIMILIS.—This species spins a large thin transparent cocoon, in which it changes its skin, it then spins a smaller and much denser cocoon, occupying about half, or not quite half, the space of the old one, and in this inner cocoon it passes the winter, leaving its cast skin in the outer chamber."

SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—October 8th, 1896.—SETTING MOTHS IN NATURAL MODE OF RESTING.—Mr. Ficklin exhibited several species of Lepidoptera—*Catocala* (3 species), *Dipterygia scabriuscula*, *Calocampa vetusta*, etc., set in their natural positions of rest, thus showing the pattern of the transverse markings which adapted them to their surroundings. ABERRATIONS OF BUTTERFLIES.—Mr. Carpenter: a male specimen of *Polyommatus icarus*, with a completely bleached hind-wing, from Folkestone; several female examples of *Pararge megera*, bred from Ranmore Common, having a tendency to form a broad black median band; and a bred series of *Chrysophanus phloas*, from Abbot's Wood, having well-developed blue spots on the secondaries. EXOTIC ORTHOPTERA.—Mr. H. Moore: two large species of Orthoptera, from Florida, viz., *Romalea microptera* and *Cyrtacanthacris subditava*. A NEW BRITISH NOCTUID.—Mr. J. T. Carrington: *Calophasia platyptera*, a species of moth new to Britain, taken by himself between Shoreham and Brighton, on September 14th, 1896. The species is closely allied to the "shark" moths, and is a native of Central and Southern Europe. The larva feeds upon toadflax (*Linaria*). RARE COLEOPTERA.—Mr. Ashdown: a specimen of the rare Coleopteron, *Molochus minor*, from Mickleham, and a black ab. of *Toxotus meridianus*, from Surrey. SCOTCH CALOCAMPA VETUSTA.—Mr. Adkin: a bred series of *Calocampa vetusta*, from Sutherland, and a bred second brood of *Acidalia virgularia (incanaria)*, from Brockley. REMARKABLE ABERRATION OF PYRAMEIS ATALANTA.—Mr. Lucas: a hitherto unnoted variety of *Pyrameis atalanta*, having the indistinct deep black blotches, which are interior to the red marginal band of the hind-wings, with well-marked blue centres. It was captured at Claygate by Mr. H. L. Hearsam, of Kingston. Cocoon

OF *PAMPHILA COMMA*.—Mr. Barrett: a pupa case and cocoon of *Pamphila comma*, which had been found by Mr. Hamm, of Reading, and also some eggs which had been deposited on stems of grass by an observed female. FOOD-PLANTS OF *P. COMMA*.—A discussion took place as to what was the usual food-plant of this species. The general opinion was that it was a grass feeder, as most Pamphilids. DIPTEROUS PARASITE ON STARLING.—Mr. C. A. Briggs: a fly taken from a starling, presumably *Ornithomyia avicularia*, one of the *Hippoboscidae* infesting birds. SECOND BROOD EXAMPLE OF *UROPTERYX SAMBUCATA*.—Mr. H. J. Turner, a living specimen of *Uropteryx sambucata*, taken in his garden on October 8th, and no doubt a second brood individual.

THE NONPAREIL ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY. —October 1st, 1896. —This meeting, being the annual general, the exhibits were not very numerous, in view of the more important business of the election of officers. Exhibits:—Mr. Gurney: *Cymatophora videns*, one of which was a very dark form. Mr. Hockett: *Polyommatus bellargus*, both male and female, from Folkestone. Mr. Samson: *Arge galathea*, from Andover Downs. Mr. Martin: a specimen of *Acherontia atropos*, bred from a larva taken in the Isle of Wight. The election of officers resulted as follows:—President, Mr. Thos. Jackson; Vice-President, Mr. W. Stevens; Curator, Mr. W. Harpur; Secretary, Mr. F. West; Treasurer, Mr. H. Blake; Reporting Secretary, Mr. F. A. Newbery; Librarian, Mr. F. A. Newbery; Trustees, Mr. Gurney and Mr. Hockett; Committee, Messrs. Hockett, Gurney, Norman (E.), Cooper, W. Harpur, Farmer, Butt, Lusby, Moore, Samson, Norman (A.). Towards the close of the evening Mr. J. A. Clark visited the society, bringing with him, for exhibition, the following:—A male and female *Nyssia lapponaria*, three superb aberrations of *Abraaxas grossulariata*, one of which was almost devoid of black markings on the fore-wings and entirely so on the hind-wings. Another was a very fine black-mantled form, whilst the third showed the yellow mantle very well; also a series of *Oporabia filigrammaria*, the specimens comprising which varied very greatly.—F. A. NEWBERY, Rep. Sec.

REVIEWS AND NOTICES OF BOOKS.

BRITISH BUTTERFLIES. By J. W. Tutt, F.E.S. 476 pp., 10 plates and 45 woodcuts. [Published by George Gill and Sons, Minerva House, Warwick Lane, London, E.C. Price 5/-.]—We are often told that a cheap book resembling Newman's, but quite up-to-date, is wanted. That is what this book professes to be. The bringing the work up-to-date has resulted in the production of a work more than twice as large as Newman, and published at two-thirds the price. The larvæ, pupæ and eggs which were unknown in the time of Newman have been added. So also has the synonymy (generic and specific), summaries of the general variation of each species, the diagnoses of 282 varieties and aberrations (of which 110 are described for the first time), and the foreign distribution of each species. There are figures of every British butterfly. Sometimes three or four figures of the same butterfly, to illustrate the two sexes, underside, and variation, are given. The full-page illustrations and most of the woodcuts have been drawn by the well-known entomological artist, Mr. W. A. Pearce.

The letterpress is divided into the following chapters:—1. General observations on butterflies and moths. 2. Egg-laying and eggs. 3. Caterpillars, their structure, and how to obtain them. 4. The chrysalis or pupa. 5. The imago or butterfly. 6. Variation of butterflies and its causes. 7. Hybernation and æstivation. 8. Names and classification of butterflies. 9. Collecting, killing, setting and storing insects. 10. Arrangement and labelling of a collection of butterflies. 11. Preservation of insects: mites, grease and mould. 12. Preservation of larvæ. 13. The Hesperids or Skipper butterflies. 14. The Coppers, Blues and Hairstreak butterflies. 15. The Papilionids, Swallow-tails, Whites and Clouded-yellow butterflies. 16. The Fritillaries and Vanessids. 17. The Emperors and Satyrids (or Meadow-browns).

Besides the above there is an "Index-Catalogue of Species, Varieties and Aberrations," an "Index to the General Subject," an "Index to the Vernacular or Common English Names," an "Index to the Family, Sub-family, Tribal and Generic Names," and an "Index to the Plates."

Each British butterfly is described under the following heads:—(1) Synonymy (Generic and Specific). (2) Imago. (3) Variation (with general remarks and summarised diagnoses of all described forms, British and Continental). (4) Egg. (5) Larva. (6) Pupa. (7) Time of appearance. (8) Habitat and Distribution. Besides these, there are extended remarks on each of the Tribes, Sub-families, Families, Divisions and Super-families. The descriptions of the "Larvæ" and "Pupæ" are largely original, and made directly from the objects by the author.

The errors in the old standard works (Newman, etc.) have been corrected, and the data which have accumulated during recent years have been incorporated. This is especially the case with the life-histories of the various species, a complete detailed life-history of every species being given.

At the end of each chapter is a concise summary giving the following information about each species:—I. Dates for finding (1) the ovum; (2) the larva; (3) the pupa; (4) the imago. II. The method of pupation. III. Food-plants.

There is no need to have the book reviewed in any more exhaustive manner in the *Record*. We can only ask that readers of the *Record* should give to the publishers, who are quite new to our branch of work, their encouragement and support.

THE GYPSY MOTH, *PORHETRIA DISPAR* (LINN.). A REPORT OF THE WORK OF DESTROYING THE INSECT IN THE COMMONWEALTH OF MASSACHUSETTS, TOGETHER WITH AN ACCOUNT OF ITS HISTORY AND HABITS, BOTH IN MASSACHUSETTS AND EUROPE. [By Edward H. Forbush and Charles H. Fernald, A.M., Ph.D., Boston, 1896. 1 vol., pp. 495, with appendices, 66 photographic and colored plates and five maps.]—I have no hesitation in saying that this work, for beauty of illustration and the thoroughness with which the subject is treated, is unrivalled in the annals of American economic entomology. It is not possible, within the brief limits of this notice, to do more than draw attention to its publication, and to state that, whatever could be done to abate this imported pest, has been done by Messrs. Forbush and Fernald, and that in this case the right persons have been entrusted with the

work. The United States is suffering from imported European insects, some of which have found their way with transported plants, others through the opportunities afforded by the immense steamer traffic between the Continents. There is not a particle of doubt that the intensity of life in America acts favourably upon imported European insects, and that they multiply excessively. Scudder says that the number of broods increases so that lepidoptera which are monogoneutic in Europe become polygoneutic in the United States. The rapidity with which the White Cabbage Butterfly has spread over North America, on its accidental escape in commercial harbours from vegetables used on passenger steamers, is something magical. Another pest has appeared about New York, the Leopard moth, *Zeuzera pyrina* (*aesculi*), and bids fair to become a dangerous nuisance. Immunity from parasites may at first contribute to aid the spread of European insect pests, while the vegetation and congenial climate assist their propagation. According to the latest theory, the *Phylloxera* was known to the ancient Greeks, and would be hence of European origin, so that it seems as though American insects have not met with the same amount of success in Europe as European immigrants in America. The late Dr. C. V. Riley asserted that destructive insects introduced from America into Europe make no headway against their more "highly developed" allies on that Continent, while the reverse is true of European pests introduced into America. Scudder opposes the idea that the more specialised European types, on that account, succeed in America, but it appears to me that Riley's view is also entitled to consideration. At first sight it seems to have been suggested, by the result attained by the white as against the red race of the human species on American soil, but it may well be that the types of insects which have spread are specialised types, although no investigations on this head are known to me. While no American lepidoptera appear to have gained a natural foothold in Europe, we have in America, *Pieris rapae*, *Porthetria dispar*, *Sesiatipuliformis*, *Zeuzera pyrina* (*aesculi*), all of which have been imported, and of all, except the *Sesia*, we have historical record. I am inclined to think that other species, which have not yet excited attention by their numbers, have been imported through commerce, or introduced by enterprising collectors. I congratulate the authors of the valuable report on the Gypsy moth upon their industry, and the results they have to show for work accomplished. As to the name which Prof. Fernald gives to the insect, it is unquestionably correct. The species is the type of *Porthetria*, and is generically distinct from *Lymantria monacha*. The oldest name for the family is *Hypogymnae*, Hübner, 1806, which I have changed to *Hypogymnidae* with the type *H. morio*.—A. RADCLIFFE GROTE, M.A., Roemer Museum, Hildesheim. [We would add our heartiest congratulations to the authors of this work. It is impossible to summarise such a comprehensive work, or to do justice to its excellence, by a cursory review. We advise our readers to press the Societies with which they are connected to write to the learned Professor of Zoology in the Massachusetts Agricultural College, U.S.A., for a copy, and we would appeal to the generosity of the authors to see that at least The Entomological Society of London, The City of London Entomological Society, and the South London Entomological Society, have copies.—ED.]

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Contributions to the fauna of the Dauphiné Alps.

I.—THE RHOPALOCERA OF LE LAUTARET—CÆNONYMPHA SATYRION
A VAR OF C. IPHIS—ARE MELAMPIAS PHARTE AND M.
MELAMPUS THE SAME SPECIES?

By J. W. TUTT, F.E.S.

The Col du Lautaret crosses the ridge which separates the valley of the Romanche from that of the Guisanne. At its highest point, 6,800ft. above the sea, is a Maison Hospitalière, founded in the 11th century, whilst near it is a Hospice, built in 1864, and now serving as an inn. This was much enlarged last winter (1895-1896), and a large clean *dependance* built directly opposite the old building, the former being remarkable for its satisfactory sanitary arrangements. The Hospice may be looked upon as being situated upon the highest point of an elevation in the middle of a huge basin, and, if the Hospice be taken as a centre, a radius of some three or four miles would strike the Roche du Grand Galibier (10,636ft.), on the east, the Pic des Trois Evêches (10,137ft.), on the north, and the Pic de Combeynot (10,378ft.), on the south. Between the first and last of these peaks the road leads down to Briançon, whilst in the opposite direction (almost due west) the road leads to La Grave. Situated as Le Lautaret is, above the tree limit, one is astounded at the marvellous luxuriance of the flora of the pasturages here. The Alpine plants of the higher pasturages, usually stunted and dwarfed, grow to an enormous size, and one wades hip-high among giant Alpine lilies, hieracii, umbellifers, campanulas, etc. At this height, too, one can get quickly on the skrees, and hence, not only can "Alpine" entomologising be begun literally at the doors, but the purely Alpine species that haunt the highest rocky slopes can be obtained without the expenditure of so much energy as is necessary when one is staying at a much lower level. My visits to the higher levels were, however, marred by the clouds which, on both occasions that I attempted to explore the highest rocky skrees, prevented the butterflies from taking wing, although the open basin below was sunny enough.

The following is a list of the Rhopalocera captured and observed during the six days' collecting (July 30th-Aug. 5th) I had here. July 28th and 29th were too wet for entomologising to be practicable.

HESPERIDES. Fam.: HESPERIDÆ. Tribe: HESPERIDI.—*Spilothryx altheae*.—A few specimens only occurred, and these rather small

in size. I can confirm the observation that newly-emerged specimens of this species rest with the wings outspread, after the fashion of a Geometer moth, except that the insect raises itself to its full height upon its legs, and that its wings then curve over as if it were set upon a bevelled setting-board. The end of the abdomen is turned very strikingly upwards. *Syrichthus alveus*.—Several specimens were captured. Three well-marked and well-coloured individuals I should have referred to *S. andromedae*, but for Mr. W. E. Nicholson's opinion that they were referable to this species. The underside of these specimens is brownish, with white markings. A dark grey inner margin on the underside of the hind-wings is most marked. *S. ab. serratulae*.^{*}—Two specimens may be referred here, whilst a male and female, the ground colour dingy brown, and with the white spots on the fore-wings very small, may be referable to *ab. carlinae*, Rbr. Another specimen is of the same size and general appearance as the last three, but it has a much better marked ante-marginal elbowed line of whitish spots. Tribe: PAMPHILID.—*Pamphila comma*.—Not uncommon, but evidently not fully out. The specimens approach the var. *catena*, and are much darker than those I have captured in the Tyrol (Mendel, Cortina, etc.). *Thymelicus lineola*.—This species occurred rather sparingly by the roadside, and on the flowery banks. My experience would lead me to suppose that this and the last species are by far the commonest and most generally distributed of the Alpine Pamphilids. They appear to be almost everywhere in Piedmont, the Tyrol (Dolomites), and Dauphiné, all, by the way, more or less limestone districts. There appears to be no difference between the specimens obtained at Le Lautaret and on the Essex coast.

PAPILIONIDES. Div.: LYCÆNIDA. Fam.: LYCÆNIDÆ. Tribe: CHRYSOPHANIDI.—*Chrysophanus hippothoë* var. *eurybia*.—This occurred rarely. The males are of a brilliant copper colour, with a trace of purple along the costa, and vary in the degree of development of the discoidal spot on the upper side of the fore-wings. The females are larger, and of a very unicolorous fuliginous brown hue, with the normal black spots distinctly marked. The underside varies much in the amount of spotting. The same form occurs commonly in the Upper Engadine, at 5,500 to about 7,000 feet. Tribe: LYCÆNIDI. *Lycæna arion*.—One specimen only was netted, and that worn to tatters. *Cupido minima*.—This species was very abundant on one huge flowery slope, from about 7,200ft.-8,000ft. elevation. Some of the specimens are typical, but others were of the *ab. alsoides*, a form as large as the following species. Mr. Nicholson took a large specimen of this species this year at Bodö, within the Arctic Circle. *Nomiades semiargus*.—Not very common, and rather poor in condition. The specimens were rather smaller than those from the Tyrol. It was found flying with the preceding species up to quite 8,000ft., and was rather more widely distributed than the last species. *Polyommatus corydon*.—I have an idea that this species occurred, but, if so, I have not brought a specimen home, and am not at all certain of the matter. *Polyommatus bellargus*.—One very worn male specimen. *Polyommatus eros*.—Locally common on the flowery slopes at the back of the

^{*}Kane refers to this form as inhabiting "Lautaret, Pyr." (*Europ. Butts.*, p. 140). One is puzzled to know whether this is Lautaret in Dauphiné, or Cauterets in the Pyrenees, or whether there is another Lautaret in the Pyrenees.

Hospice, towards the Col du Galibier. The underside of the male is very like that of an indistinctly marked *P. icarus*. The female has the marginal lunules distinct beneath. Above, the females have the bases of the wings shaded with blue as far as the discoidal spot, and thus approach very closely to Oberthür's ab. *caeruleus*, from the Pyrenees. *Polyommatus icarus*.—Not very common, small in size, and the males rather purplish in tone. The females not sprinkled with blue scales. The ab. *icarinus* occurred in both sexes. *Polyommatus orbitulus*.—This species was not uncommon at its favourite haunts, viz., puddles in the roadway. Both sexes were captured, and specimens of both sexes show considerable variation in the shape of the wing, the latter being occasionally longer and more pointed than is usual in typical specimens. This appears to be not unusual, for Mr. Nicholson says that he has frequently seen the wings as pointed as those I have captured. The undersides of all the wings vary in the number and intensity of the spots. *Polyommatus damon*.—This species, the Blue butterfly of Dauphiné, was just emerging. The specimens were rather smaller than any I had taken previously (Piedmont, St. Michel-de-Maurienne). The females were not out. I was surprised to find the insect at 8,000ft. elevation. *Polyommatus eumedon*.—Only one seen (and captured). The specimen is typical, Mr. Nicholson says, although the underside is rather less spotted than Kane's description would lead one to suppose. *Polyommatus astrarche*.—Occurred sparingly on all the flowery slopes. The male specimens with only a few marginal orange spots, the female with a strongly developed series of them bordering both the fore- and hind-wings. *Plebeius optilete*.—Only one female specimen seen. Fairly typical. Mr. Nicholson informs me that he captured a form of this species this year in Arctic Norway, so that it is widely distributed. *Plebeius argus*.—Not uncommon on a steep rocky slope, covered with a profusion of wild flowers, at an elevation of about 8,000ft. I only saw males, the females probably not having emerged. The males have the greyish-brown undersides, small spots, and rather large silvery blotches of typical *argus*. Oberthür's notes on this species and the allied *P. acyon* (*Etudes*, vol. v., p. 21) are most interesting.

Div.: PAPILIONIDA. Fam.: PAPILIONIDÆ. Tribe: PAPILIONIDI.—*Papilio machaon*.—This species occurred up to about 9,000ft. It loves the top of a grassy knoll situated at or near the summit of a mountain peak, round the highest point of which it flies with great speed. The Alpine form taken here is only a little more heavily marked than British examples. Tribe: PARNASSIDI. *Parnassius delius*.—Seen but not caught, although there can be no doubt about the species. Its only haunt, so far as I could discover, was a steep rocky slope, where it was totally impossible to follow it; and, as I only found the species on the morning of the day that I left Le Lautaret, I had no chance of surprising an unwary example.

Fam.: PIERIDÆ. Tribe: APORIDI.—*Aporia crataegi*.—Occasional males and females occurred up to 8,000ft. What the larvæ could feed on here I cannot guess, and strongly suspect that they were stragglers from the lower valleys, where they were abundant enough. If so, it would suggest that this species is in reality somewhat of a wanderer, an opinion that I formed both at Courmayeur and in the Tyrol, when odd specimens were frequently captured in unlikely

places. Tribe: PIERIDI.—*Pieris callidice*.—Rare, and difficult to catch. Both sexes were in fine condition. Tribe: RHODOCERIDI.—*Colias palaeno*.—Rare, but in fine condition, occurred round the Hospice, as well as on the higher slopes. *Colias phicomone*.—Fairly common, and distributed all over the district. The specimens varied in condition; some were very fine. One female drying her wings was taken; but, although I searched closely, I could not find the pupa case.

Fam.: NYMPHALIDÆ. Tribe: VANESSIDI.—*Aglais urticae*.—Exceedingly abundant in the larval state on stinging-nettle. The few imagines observed were all of the large, deeply-coloured, Alpine form; but larvæ, which I took when nearly full-fed, and which pupated after a few days' starvation, produced in London, on August 30th, specimens of the most ordinary British type as to the colour of the upper sides, although there is a marked distinction between the pale and light areas of the underside, and the ante-marginal row of blue lunules on the underside of the hind-wings is especially well-marked. Tribe: ARGYNNIDI.—*Argynnis lathonia*.—I should have left Lantaret with the impression that the species did not occur in the district, but for the fact that I captured a fine freshly emerged specimen on the morning of my departure. *Argynnis niobe* ab. *eris*.—A single specimen only seen and captured. Probably it was not fully out. *Argynnis aglaja*.—A few male specimens only captured. The species was probably not fully out. Those I caught were fully coloured, but rather small. *Brenthis pales*.—Common all over the flowery slopes, and found up to 9,000ft. Some of the males are well marked and richly coloured. Others (ab. *obsolescens*) have the black markings much reduced, and these form a very large percentage of the whole. The female ab. *napaea* was more common than females of fulvous coloration. The undersides of many of the specimens are remarkably free from black markings (ab. *isis*). Tribe: MELITEIDI.—*Melitaea cynthia*.—Both sexes were on the wing, the males tattered, the females worn. Evidently the species was over. The species occurred near the Hospice, but was much more abundant about 1,000ft. above it. *Melitaea aurinia* var. *merope*.—This species also was over. A few worn specimens passed through the net, and two females, rather larger than is usual in this variety, were brought home.

Fam.: SATYRIDÆ. Tribe: COENONYMPHIDI. *Coenonympha iphis*.—Probably the most abundant and interesting butterfly in the district. The sexual dimorphism is very marked on the upper sides, the male of a deep fulvous, the female with the fore-wings much paler. The variation of the undersides of both sexes presents such a slow gradation from the entirely unocellated, to the conspicuously banded and strongly ocellated form, that one is confronted at last with all the recognised characters of *C. satyrium* in undoubted specimens of *C. iphis*. The most extreme form of the underside of both sexes has no ocellated spots on either the fore- or hind-wings, the latter being entirely greenish-grey, but for the brown tint of the base, and a small triangular remnant of the whitish transverse band that crosses the wings in some specimens. The ocellated spots gradually increase in number, until they reach a maximum of six on the underside of the hind-wings, and one on the fore-wings. The white patch, too, is accompanied in some specimens by another towards

the anal angle; these, in turn, increase until a series of whitish blotches, stretches across the wing within the ocellated spots, and these, again, give place to a white band enclosing them. In this extreme form they show, save for their larger size, no character to distinguish them from *C. satyrion*, typical forms of which occur with this remarkable race of *C. iphis*. My series leaves no doubt whatever that *satyrion* is a form of the latter species, or that the two species here assume such similar forms that they present no character which renders them separable, either on the upper or underside, for, if we sort out those with a white transverse band on the underside of the hind-wings as *C. satyrion*, and leave the remainder as *C. iphis*, we should separate two specimens that I found in copulá, of which the male would go to *satyrion* and the female to *iphis*. One of the most *satyrion*-like ♀ specimens that I captured is identical on the upper side with Hübner's figure (250) of ♀ *iphis*. Another *satyrion*-like ♀ on the upper side has two indistinct ocellated spots on the upper side of the hind-wings. The underside of this specimen is peculiarly *iphis*, and it comes, perhaps, nearer to the specimens of *iphis* in the British Museum collection than any others I have taken. A few female specimens have a washed-out appearance. This form is the *mandane* of Kirby. The males vary in tint on the upper side from a warm fulvous hue to a dirty fuliginous brown, with every intermediate shade. The worn male specimens are particularly dingy looking. The orange marginal line is quite absent in some male specimens, in others it forms a very distinct and conspicuous mark near the anal angle of the hind-wing. The upper side of the female extends from a form with entirely bright tawny fore-wings, with an orange marginal line, to a form with a dark outer margin (more than one-eighth of an inch in expanse), through which the orange marginal line runs. These latter graduate to male forms in which the grey suffusion is more or less spread over the fore-wings, and the specimens then become typical *satyrion*. The hind-wings of the females are all more or less fuliginous brown, with a fulvous tinge in the centre and towards the base. So unlike the typical forms of this species as figured by Hübner (figs. 249-251) are the Lantaret specimens that I propose calling this race var. *dauphini*. The race is composed of specimens which may be classified as:—

(1) *ab. obsoleta*. Without any ocellated spots on the underside of fore and hind-wings. (2) *Ab. intermedia*. With a more or less complete series of ocellated spots on the underside of the hind-wings (and sometimes a trace of a single one on fore-wings), but the white band only represented by two or three broken blotches. (3) *Ab. virgata*. With a complete white band crossing the underside of the hind-wings, and containing the ocellated spots towards its outer margin. I may here mention that this latter differs from Hübner's type (fig. 251), inasmuch as in the latter the white band is complete, but does not reach to, and therefore does not include, the ocellated spots. The var. *dauphini* may be best separated as a whole from the ordinary typical German form (evidently the one figured by Hübner) by the almost entire absence, in both sexes, of ocellated spots on the upper side of the fore- and hind-wings. *Ctenonympha satyrion*.—I have already stated that I believe, and that my series proves, *C. satyrion* to be a form of *C. iphis*, or, if the two be distinct species, that the latter assumes a form with a well defined white band, containing a series of ocellated spots on the

underside of the hind-wings, inseparable from *C. satyrion*. There is every possible intermediate grade between the most typical *iphis* and *C. satyrion*, the latter of which, in its most typical form, occurs here. It should be added, in order that the matter may receive that judicial consideration that it deserves, that I had an opinion that those specimens that were most like typical *satyrion* were rather more *passé* than the mass of the typical specimens of *iphis*, but it may be that their worn condition, which certainly made them appear darker, was the cause of this. To this species (or variety), then, I refer a few of the smaller and darker specimens of both sexes, the males of which are of a dark fuliginous brown, and the fore-wings of the females more shaded with brown grey than is usual with the females captured at Lautaret. These darker specimens have nothing to separate them from *ab. virgata* above, except the more fuliginous tint of the fore-wings. Some male specimens of the *abs. obsoleta* and *intermedia* are not at all separable from these on the upper-sides. *Coenonympha pamphilus*.—Decidedly rare. Of a bright tawny colour, with darker outer margin. The underside fairly typical.

Tribe: EREBIDÆ.—*Melampias epiphron*.—The form that occurs here shows, in the male, the fulvous band of the fore-wings reduced to a series of small interneural fulvous blotches, each containing a black dot, whilst on the hind-wings there are usually two or three small fulvous rings, each containing a black dot. The females have a wide, continuous, fulvous band crossing the fore-wings, containing 2, 3, 4 or 5 small black dots, whilst the hind-wings have four small fulvous rings, three of which contain black central dots. The underside of the fore-wings of the females is almost entirely fulvous, whilst the underside of the hind-wings is much paler than that of the males, and bears only the faintest traces of the fulvous rings and dots that characterise the upper side. *Melampias melampus* and *M. pharte*.—At Lautaret, the males run from typical *melampus*, with four or five black dots in the fulvous band, through specimens with 3, 2, 1 and no black dots, *i.e.*, to typical male *pharte*. The shape of the wings, too, varies from the typical rounded-winged *melampus* to the more pointed-winged *pharte*, some of the specimens which are *pharte*, so far as their unspotted band goes, being *melampus* by the rounded character of the apices of the fore-wings. The females are all typical *pharte*, with a band more orange than fulvous, and with the band distinctly pale, as in *pharte*, on the underside. It would appear that here *melampus* and *pharte* form but one species, however distinct they may be in some districts. Of course, it would be easy to separate the spotted forms from the unspotted forms, and call the former *melampus*, and the latter *pharte*, but it would not get over the difficulty of the females being all of one form, nor of the fact that a proportion of the *melampus*-shaped males are unspotted, and *vice versa*. The species were not uncommon in the flowery meadows, but rather *passé*. Mr. Nicholson, to whom I have submitted the specimens, writes: "I believe all these specimens to be *melampus*. The round-winged specimens are very like my Swiss ones. *Melampus* is hard to define as a species." If Mr. Nicholson's views were to be accepted, it would create a difficulty, for I observe of Hübner's figs. 491-494, from which the species *pharte* is named:—"Hübner's figs. 491 and 492 are identical with the Lautaret females, whilst his figs. 493 and 494 are

identical with most of the unspotted males, only Hübner, strangely enough, whilst showing the colour dimorphism that exists between the sexes, has transposed the bodies, so that figs. 491-492 have ♀ coloration and ♂ body, whilst figs. 493-494 have ♂ coloration and ♀ body." Berce (p. 188) makes the following suggestive observation about *M. pharte*: "A little larger than *melampus*, from which it differs in that the ferruginous blotches are altogether devoid of black points, those of the superior wings more rectangular, those of the inferior wings a little oval. It has the same habits as *melampus*, and is found at the same time, and in the same localities.' *Melampias ecto*.—Two specimens only were captured, both worn, so that the species was probably going over. These were both captured close by the Hospice. Kane gives Lautaret as a locality for this species. *Erebia mnestra*.—A single female specimen of a species of *Erebia*, which I think must be referable to this species, was captured. It is of a dark fuscous brown colour, with an ill-defined unspotted tawny band running parallel to the hind margin of the fore-wings, and continued faintly on the upper half of the hind-wings. The underside of the fore-wing is bright tawny, except for a grey-brown outer margin and a narrow grey-brown costal margin. The hind-wings grey-brown at the base, extending rather more than half way over the wing, followed by a pale grey band, and with the outer margin of the same colour as the basal area. Those who know the ordinary form of *E. mnestra*, especially the male, will recognise that this is very different on the underside, and its banded character gives us (if I am right in my determination) a species in which the male belongs to the "*Epiphron-melampus* group," whilst the female approaches the "*tyndarus* group," I see that there is a female specimen with a trace of the band on the underside of the hind-wings in the British Museum collection, but this specimen possesses also ocellated spots towards the apex of the upperside of the fore-wings, which the Lautaret specimen lacks. *Erebia tyndarus*. — The specimens of this species are remarkably well marked, they are also of very fair size. The males have the fulvous patch variable in size (in some it is almost absent); in the females it is much larger, in one, occupying all the central area of the wing, almost to base. In another female it is of an orange tint. There are usually two well-developed ocellated spots on the fore-wings, and three or four on the hind-wings. In one ♂ and one ♀ the ocellated spots on the fore-wings are much reduced, but none have them quite absent, nor without white centres. I saw nothing resembling the ab. *coccodromus* from Mont de la Saxe, the Penegal, and Oberalp. One female has four large well-ocellated spots on fore-wings, another with two large ocellated spots and two blind smaller ones beneath. The form with extra ocellated spots on fore-wings I would call ab. *addenda*. One ♀ and one ♂ are pallid, the pigment largely failing. Two forms of the underside of the hind-wings occur:—(1) Dark grey with darker central band. The females of this form have the ground colour paler grey, with darker central band. (2) Dark grey, unicolorous, with only the faintest trace of transverse lines. The ♀s belonging to this form have the underside of hind-wings unicolorous, greyish or silvery-white. There is a faint tint of ochreous in the undersides of a few of the specimens. *Erebia gorge*. — Only two specimens captured, owing to the clouds that persisted about the highest peaks. Probably the

insect is common on the higher skrees. *Erebia euryale*.—Two very fresh examples only were captured. These were dark, with well-defined fulvous transverse spotted band on the upper side of the fore-wings, and no trace of white transverse markings on the underside of the hind-wings. This is of the same form as was obtained between St. Michel-de-Maurienne and Valloire. The *adyte* of Hübner is given by Standinger as a var. of *ligea* from “? Lapland.” I have examined Hübner's figures (759 and 760) carefully, and find them to represent the Lautaret form of *euryale*, in which the underside of the hind-wings is without any trace of the white transverse markings of the underside of the hind-wings. The insect is probably rare here, unless it was not yet fully out. The height (above 7,000ft.) would suggest that it was near the limit of its range (altitude).

A new British Coccid (with plate).

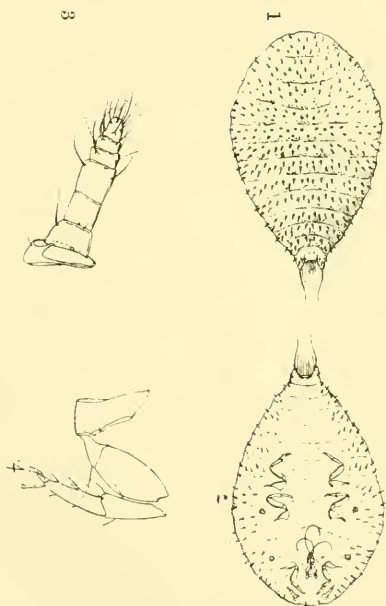
By E. ERNEST GREEN, F.E.S.

Rhizococcus (?) *deroniensis*, sp. nov.—Sac of adult ♀ creamy white; closely felted and firm, but with short erect fibres on the surface; broadly oval; convex. Size very variable; length from 1.75 mm. to 2.50 mm.; breadth from 1.50 mm. to 1.75 mm.; depth from 1 to 1.25 mm.

Sac of ♂ small; white; linear. Length 1.50 mm.; breadth 0.50 mm.

Adult ♀ reddish-purple; oval, rounded in front, narrowest and tapering posteriorly; the extremity with a pair of prominent anal tubercles. Dorsal area (fig. 1) rather convex, and studded with numerous short conical tubular spines, some of which are rather sharply pointed, while others have the apices slightly truncate. The spines are subequal in size, and evenly distributed over the surface without any definite marginal series. Ventral surface (fig. 2) without spines, except towards the lateral margins; their place being taken by a few fine hairs or bristles. There are some small circular pores (ceriferous glands) scattered over the surface of the body. Antenna (fig. 3) of seven joints, of which the 3rd and 4th are usually subequal and longest, though sometimes the 3rd and sometimes the 4th is the longer. The 5th and 6th joints are subequal, and shortest. The terminal joint bears from 10 to 12 stout hairs; the 3rd joint is hairless; each of the other joints have two or three placed near the distal extremity. The legs (fig. 4) are rather stout; the tarsus a little longer than the tibia; the tibia and tarsus together slightly longer than the combined femur and trochanter. The extremity of the tibia is considerably broader than the base of the tarsus; both joints have some stout spines on the inner margin. Claw stout, and curved at the tip. Tarsal and ungual digitules, both in the form of long knobbed hairs, the tarsals being the longer. Rostrum situate between the coxæ of the anterior pair of legs; the conical mentum doubtfully trimerous, three darker chitinous bands crossing it. Spiracles large and conspicuous, situate postero-laterad of the first and second pairs of legs respectively. The anal tubercles each bear a longish stout seta at the extremity, and a smaller one on the inner side, besides several conical spines. Anal ring with six stout hairs. Length (of prepared and compressed examples) from 1.50 to 2.50 mm. Breadth 1 to 1.50 mm.

Adult ♂ not observed.



A NEW BRITISH COCCID (*Rhizococcus (?) detritensis*).

Larval and second stages not observed.

Eggs pink or pinkish-yellow, dusted with a mealy powder. Length 0.30 to 0.35 mm.

Habitat:—On *Erica cinerea*: Budleigh-Salterton, S. Devon; August, September.

My attention was first drawn to the insect by its habit of distorting the young shoots of the plant upon which it fixes itself. In many cases the terminal part of the shoot is twisted up in a rosette-shaped knot, enclosing one or more of the insects. Other shoots are bent at right angles at the point of irritation. This distortion occurs only when the insect has attached itself to the young growing parts of the plant; the older stems are not affected in the same way.

In August, when the insects were first noticed, the female sacs were already packed with ova, the female being much shrivelled, and occupying the anterior extremity of the sac. The male sacs had apparently been vacated for some time. No other stages of the insect were observed; but the white sacs of the adult insect were abundant, and widely distributed on this one species of *Erica*. Not a single example occurred on either the common heath or the "ling" (*Calluna vulgaris*).

I at first supposed the species to be *Eriococcus ericæ*, Sign.; but a microscopical examination proved it to be both specifically and generically distinct (according to Signoret's classification). The 7-jointed antennæ separate it from typical *Eriococcus*, but allow of its inclusion in *Rhizococcus*, though Mr. Maskell considers that that genus should be reserved for species that remain naked in the final stage. Signoret, in defining the genus, says:—"It closely resembles the preceding species of the genera *Eriococcus* and *Acanthococcus*, but without the sac; perhaps it possesses one later. But in any case, it must form a distinct genus on account of the 7-jointed antennæ." The structural character being the same, the presence or otherwise of an ovisac would scarcely be of generic importance. The same differences are allowed, without question, in the genera *Dactylopius* and *Pseudococcus*. Personally I am also of the opinion that the number of antennal joints—other characters being similar—is insufficient for the separation of the genera, and that *Eriococcus* and *Rhizococcus* might be combined under one name.

It will be noted that the present species has six hairs only on the anal ring—an unusual number—all the other members of the genus being apparently possessed of eight.

DESCRIPTION OF PLATE III.—Fig. 1.—*Rhizococcus devoniensis*, Green, adult ♀ dorsal view. Fig. 2.—*Rhizococcus devoniensis*, Green, adult ♀ ventral view. Fig. 3.—*Rhizococcus devoniensis*, Green, antenna of adult ♀. Fig. 4.—*Rhizococcus devoniensis*, leg.

The Antennæ of Lepidoptera. Their structure, functions and evolution.

(Concluded from p. 228).

By J. W. TUTT, F.E.S.

The senses which are supposed to have their peripheral organs in the antennæ are those of touch, taste, smell and hearing. (1) TOUCH.—It is supposed that the several types of sense-hairs already described are especially adapted for the reception of tactile impressions. The

external chitinous skeleton of an insect makes it possible that the hairs are even more effective than usual as intermediaries in the transmission of the external force to the nerve termination. It is also probable that the different types of hairs receive different sorts of impressions, which ultimately produce the idea of touch, pressure, weight, etc. (2) SMELL.—The sense of smell is very acute in Lepidoptera, and a large number of species of both moths and butterflies are known to possess special organs for the emission of odours. The rapidity with which NOCTUIDES, TORTRICIDES, etc., find sugar, spread as a bait on trees; the ease with which all Lepidoptera detect the right food-plant on which to deposit their eggs, and the wonderful cases of assembling, which have been chronicled, are all sufficient to show that some marvellous power of perception is owned by Lepidoptera, and all logical enquiry suggests that this power must closely resemble our sense of smell. We have elsewhere* enlarged considerably on this topic, and need only add here that there are many reasons why the pits and rods of the antennæ should be regarded as the peripheral organs of this sense. Viallanes† says the antennal nerve is provided with two roots; one, ventral, composed exclusively of fibres affected by special sensibility, arises from the olfactory lobe; the other, dorsal, which includes at once motor fibres and fibres of general sensibility, arises from the dorsal lobe of the deutocerebron. It has been stated that "Lepidoptera possess this faculty (gift of scent) beyond doubt, and as the air inhaled is the carrying medium, we must look to the spiracles as the organs of smell." This opinion is absurd, for it rests upon the assumption that the condition found in the higher vertebrates must also obtain in lower forms. Air is doubtless the carrying medium, but air has access to the rods in the pits of the antennæ. That simple diffusion of the air containing the olfactory particles is sufficient, and that a current of air is not needed to excite the nerves, is abundantly proved by the conditions existing among the lower vertebrates (sharks, *Amia calva*, *Petromyzon marinus*, etc., have been instanced). Hauser‡ states that bees and wasps have 14,000 to 15,000 cavities, and about 200 cones in each antenna; the leaf-wasps a smaller number. The flesh and dirt flies have 60 to 150, while the flies that live on plants have only 5 to 6 on each feeler. Hence the number of cavities (pits and rods) and cones occurring in an antenna appears to be correlated with the importance of the power of distinguishing scent, in the life of the species. 3. HEARING.—It is extremely probable that, from Child's|| experiments on the *Culicidae* and *Chironomidae*, that the antennæ function as organs of hearing. Bodine thinks that the set of apparatus described under section 6 (*ante*, p. 227), is especially adapted to the perception of any sort of delicate pulsation of sound waves. 4. TASTE.—It has been supposed by some biologists that the rods and cones of the antennæ function as organs of

* *Random Recollections of Woodland, Fen and Hill*, 2nd Edn., pp. 22-24; 124-127. * *British Noctuae and their Varieties*, vol. iii., pp. iv-viii. * *British Butterflies*, pp. 19-20; 62-63.

† "Études histologique et organologique sur les centres nerveux et les Organes des sens des Animaux articles."—*Ann. de Sci. Nat. Zoologie*, 8 Series, T. 14, Paris, 1893, pp. 409—456.

‡ *Popular Science Monthly*, vol. xxiii., p. 284.

|| *Zcit. f. w. Zool.*, Bd. 38, 1894. pp. 475—528.

taste, but the evidence previously offered is of the most unsatisfactory character.

The evolution of the antennæ is a comprehensive, but interesting subject. The antenna of *Micropteryx* (Pl. II., fig. 1) is probably the most generalised form now existing among Lepidoptera, and Bodine thinks that "the primitive antenna was made up of a scape large enough to afford room for the strong muscles to provide for the movement of the pedicel, and also to contain the large trunks of tracheæ and nerves which supply the parts distad; of a pedicel large enough to provide space for the nervous apparatus previously described (and numbered 6, *ante* p. 227), of a clavola composed of numerous segments, probably at least a score, all of them very much alike. What was the character of the chitinous surface we cannot say. Doubtless there were hairs of the first type. There may have already been specialised hairs of the second type."

As may be expected in the evolution of any complex organ, modification of various parts may progress together. This has happened in the case of the antenna, and, although it is convenient to consider the modifications separately, it must be understood that the same antenna may present more than one modification.

The variation of the scape and pedicel is usually dependent on the changes of the clavola. The *scape* has become modified in two directions: (1) Increase in diameter and relative shortening, as in the Papilionids (Pl. II., fig. 2), Hesperids, etc. (2) Lengthening without marked increase in diameter, as in the Adelids. The first tends to produce exact and definite movement. The second, more independent movement. The *pedicel* shows but little variation, although it is relatively larger in those families which are highly specialised. Its development is probably correlated with that of the contained nervous apparatus.

The *clavola* is the part of the antenna that has undergone most variation. The primitive form of the segments of the clavola was probably cylindrical, probably covered with hairs having the double function of protection and sense-perception. Differentiation of the hairs into different types was accompanied by their concentration in particular areas, and hence those connected with sense-perception became localised on the ventral, those for protection on the dorsal, aspect. Since the chief function of the antenna is sense-perception, specialisation in the direction of enlarging that part which bears the sense organs, as well as an increase in the efficiency of the organs, went on side by side.

The enlargement took place in two ways: (1) By the formation of a ventral ridge, as in *Pyrausta*, *Crambus*, *Sphingidae*, etc. (2) By the projection of small portions of the segments to form pectinations, as in the Saturniids, Bombycids, etc. In many Lepidoptera the pectinations are more marked in the male than in the female. Poulton,* arguing from the similarity of the pupal antennæ in both sexes, considers that the difference has been produced by a degeneration of these organs in one sex, and a corresponding development in the other. Wood† has suggested that sexual functional stimulus causes the development to take place in both sexes alike at the commencement of

* *Trans. Linn. Soc. Lond.*, 1890, p. 247 *et seq.*

† *Entom. Rec.*, vol. iv., pp. 237-238.

the pupal stage, and that, whilst those of the male continue to develop, those of the female cease their temporary growth, and then perhaps tend to be reduced by absorption, whilst the register of the point of development reached at the crucial point of growth cannot be removed by absorption, but remains permanently impressed on the pupal skin. Bodine thinks that in the large majority of cases the females have simply not kept pace with the males in the specialisation of their antennæ, calling attention to the fact, that in these insects, early oviposition is the rule, and that the struggle of the males to find the females quickly would cause a sudden and extreme specialisation of their antennæ without a corresponding influence upon the female.

Side by side with the increase in the area of the sensitive surface, the differentiation of the hair structures, and a corresponding increase in their efficiency, probably took place. It is not difficult to understand how the sense-hairs 2 and 3 (Pl. II., figs. 4-5), originated from the typical form (fig. 3). Different antennæ give different degrees of variation, and whilst the long rigid hair of the second type probably arose before the separation of JUGATÆ and FRENATÆ, the third type appears not to have been evolved until after the Hesperids and Papilionids had branched from the Frenate stem. It is highly developed in the Noctuids and Arctiids. The pits, are very different from the simple sense-hair, yet, in many insects, the pits carry hairs instead of the rods in the more highly developed pits, and, according to Bodine, "different specimens will present various stages of transition from the hair in a comparatively slight pit to a short rod in a deeper one." The cones are a distinct development, and, according to the same author, "must have originated after the separation of the JUGATÆ and the FRENATÆ, and also after the HESPERIDÆ and PAPILIONIDÆ branched from the latter. All the FRENATÆ, except these two super-families, and possibly the *Pyromorphidæ*,* possess these organs. In all of the MICROFRENATÆ, and in most of the MACROFRENATÆ, they are distributed one to a segment. . . . In some of the MACROFRENATÆ, however, they number more than one to a segment, and in pectinate antennæ they have often migrated from the shaft to a position upon the pectinations. . . . Among the *Saturniidæ*, the number of cones to a segment is greatly increased. . . . It is perhaps worth noting here that, while the females are usually behind the males in the development of pectinations, they are not at all deficient in the number or the perfection of the cones." The surface of the chitinous exoskeleton of the clavola is, as a whole, even in the JUGATÆ, but "has numerous slender prolongations, which have received the name of 'fixed hairs,' and which are continuous with, and parts of, the general surface, and are not articulated with the chitin like true hairs. These are not found in the FRENATÆ, but the whole surface is "divided up into more or less hexagonal areas (Pl. II., figs. 8-9)." Bodine thinks these two kinds of surface indicate a dichotomous division in the line of descent. The surface-marking of the chitin of the clavola, Bodine considers, probably exists in its most primitive condition in the antennæ of the PYRALIDINÆ (Pl. II., fig. 8), in which the general surface, though somewhat smooth, is divided up into more or less hexagonal areas. In the Tortricids, the areas become elongated, in the Tineids, the lengthening is carried much farther, whilst in *Orgyia* and *Cerura*,

*Very close to *Zyguenidæ*.

there is much development in the direction of the formation of ridges, which give the whole an appearance of being covered with fine points. In Papilionids (Pl. II., fig. 9) and many other lepidoptera the plates are smaller, more uniform, and form a regular imbricated surface. Bodine then adds:—"As might be expected, the extent to which these surface-modifications of the structure of the chitin is carried, depends largely upon the development of scales. Where the antenna is heavily clothed, we find usually less departure from the primitive form of surface, especially if the scales are closely and compactly arranged. In most cases, the surface of the scape and pedicel is practically smooth. This is doubtless in consequence of the covering of thick tufts of long slender scales, and also because the abundant scales of the vertex of the head afford it sufficient protection."

To those who wish to follow the application of antennal structure to the classification of Lepidoptera, we can confidently recommend a perusal of Dr. Bodine's excellent paper. It will show our younger entomological students what is being done on the other side of the water, and will serve as a splendid guide as to the course of study, which may usefully be pursued with any special organ of a lepidopterous insect.

NOTES ON LIFE-HISTORIES, LARVÆ, &c.

DOUBLE-BROODEDNESS OF *ACIDALIA SUBSERICEATA*.—In the *Ent. Record*, ante, p.192, there is a note from Mr. Tutt with regard to *Acidalia subsericeata*, in which he expresses surprise (even in the past hot season) that there should have been two emergences in one year. This is the rule, and not the exception, in confinement, as it is also with *Acidalia trigeminata*, as the following dates in my own experience will show:—(1). *A. subsericeata*.—1884:—Ova obtained June 21st, 2nd brood bred August 9th; 1885:—Ova obtained July 10th, 2nd brood bred end of August; 1887:—Ova obtained June 27th, 2nd brood bred August 17th to 28th. On one occasion I bred a third brood, but unfortunately omitted to record it. I think the form *maneuiniata* is the second brood. (2). *Acidalia trigeminata*.—1894:—Ova obtained July 7th, 2nd brood bred September 16th; 1896:—Ova obtained June 13th, 2nd brood bred August 15th to 22nd.—C. FENN, F.E.S., Eversden House, Burnt Ash Hill, Lee. October 10th, 1896.

NEWLY-HATCHED LARVA OF *HIPPARCHIA SEMELE*.—The empty egg-shell appears to have been partly eaten, one-fourth or more of it remaining. This is of a pearly white colour, and the ribbing is very distinct.

The young larva is, in some ways, highly specialised, and wriggles about very much when disturbed. It has two large well-developed anal points. The skin is of a dirty whitish colour. A brownish dorsal line runs down the length of the body; a similar sub-dorsal brownish line on each side includes the posterior trapezoidals; another brownish supra-spiracular line on each side includes the supra-spiracular tubercles. The surface of the body is, therefore, made up of alternate longitudinal stripes of pale and darker colour, there being two dark longitudinal lines on each side of the dark median line. The skin is covered with minute shiny points, bearing fine glassy-looking bristles. The head is much larger than the thoracic segments. It is of a pale orange

colour, minutely pitted, and bearing numerous whitish hairs, of which eight on the crown and front of the face, arising from black points, suggest a tuberculate origin. The ocelli are exceedingly black, and closely packed, and hence are very conspicuous on the pale cheeks. The mouth parts are very pale brownish. The thoracic segments each bear four minute black tubercles, arranged in a straight transverse line over the dorsum of each segment. Each of the two anterior and two posterior trapezoidals (arranged thus . . .) of the abdominal segments bears a short pale shiny bristle. The anterior trapezoidals are much larger than the posterior. The anterior are placed on the first, and the posterior on the third sub-segment. The abdominal segments appear to be sub-divided into four main sub-segments, of which two are again more or less sub-divided. The thoracic spiracle is large, black and conspicuous. There is a black prespiracular tubercle, bearing a long black hair. Across the dorsum of the thoracic segments there are 8 small black tubercular points, the most lateral pair (one on either side) being situated a little out of the line of (behind) the others. The true legs are transparent and glassy, and each one is terminated with a black hook or claw.

The abdominal segments 1, 2, 3, 4 and 5, are about the same width as the thoracic segments, but the hinder abdominal segments narrow off to the anal segment. The anterior trapezoidal tubercles are placed on the pale skin which runs down on each side of the dorsal line. The posterior trapezoidals are placed on the brownish sub-dorsal lines. The supra-spiracular tubercles are on the brownish supra-spiracular line. There are two sub-spiracular tubercles, one slightly in advance of, and the other slightly posterior to, the spiracle, but some distance below. The segment preceding the anal segment bears only two dorsal tubercles. The abdominal spiracles are black and conspicuous; the lateral tubercles are also black, each bearing a pale hair. The anal points are made up of the coalesced tubercles of the anal segment (3 for each point). The tubercles themselves are conspicuously placed at the end of a pale prolongation, each bearing a pale glassy-looking hair directed backwards. The prolegs are almost transparent, each bearing a pair of black marginal tubercles on the upper joint. The anal prolegs are large and spreading. The crotchets, or hooks, at the end of the prolegs are black. Description made September 16th, the day of hatching.

The larvæ were observed to be much greener two days after hatching (Sept. 18th). This was probably due to the food they had eaten.—J. W. TUTT.

THE EGG-LAYING OF *HIPPARCHIA SEMELE*.—I found one egg only out-of-doors, but several others were deposited in a glass case under fairly natural conditions. Almost all these were placed about midway down a grass blade. They were always laid on a fresh green culm or blade, as is the case with *Pararge egeria* and *P. megera*, and unlike *Epinephele ianira* and *E. tithonus*, which seem to prefer to get near the ground, and, I think, most often select the brown pieces of grass on which to lay. Two or three only of the *H. semele* eggs were laid on the glass sides of the case, and, as you saw, eight were on the middle pair of legs of one of the butterflies (*vide, ante*, p. 214). I imprisoned two rather worn females, and I had the impression that but one laid. Those eggs on the butterfly's legs were probably the last she laid.

When they had been in captivity just a week, I noticed, one morning, two eggs on each of the middle pair of legs of one of the butterflies. She was standing on the ground, and, to see if she was still vigorous, I disturbed her, when she flew about for a few minutes, banging herself a good deal against the glass, as the eggs prevented her feet taking hold. The eggs seemed very strong, and firmly attached, as I could plainly see some of them knocked against the glass, yet not one was either loosened or broken. I allowed the other butterfly to fly away, and she seemed none the worse for her seven days' imprisonment. On my return that night the second was dead, and on the same legs four additional eggs (3 on one leg, one on the other) had been laid. On the 21st and 22nd day after the eggs had been laid the whole eight hatched. The young larvæ did not eat their egg-shells, or only so much of them as was necessary for their escape; indeed, they seemed to eat nothing for three or four days, but are now doing well. They do not yet leave the grass culms day or night, and when I lift the glass they are in, to look at them, none of them drop, but all bend themselves into little hooks, holding on with the claspers and turning their heads to one side, in which position they remain still. The empty egg-shells are pretty objects viewed with a very low power ($1\frac{1}{2}$ inch I use).—J. WOLFE, Skibbereen, co. Cork. *September 30th, 1896.*

NOTES ON COLLECTING, Etc.

LEPIDOPTERA AT CHICHESTER.—I cannot say that I have found the past season one especially good for Lepidoptera. I fancy that droughts are prejudicial rather than favourable to their increase. During May, *Asthena candidata* was abundant, and on the 9th of the month the first *Smerinthus populi* was met with. A little later *Emmelesia affinitata*, *E. decolorata* and *Eurymene dolobraria* were taken. The first *Euchloë cardamines* I noted was a ♀, taken asleep, in Hunston Coppice. In June, *Spilosoma menthastri*, *Zonosoma trilinearia*, *Brenthis selene*, *Anaitis plagiata*, *Asthena luteata*, *Eupithecia rectangulata*, *Sesia tipuliformis*, *Miana strigilis*, *Timandra amataria*, *Melanippe procellata*, *Arylia putris*, *Cidaria dotata* (*pyraliata*), *Hadena hepatica*, *Ourapteryx sambucata*, *Acidalia imitaria*, and cocoons of *Leucoma salicis* were found. During this month both sexes of the great stag-beetle were to be seen in the evening flying round elms, limes, and other trees, and some coming within reach were knocked down and captured. On July 1st, *Nola cucullatella*; on 4th, *Iodis vernaria* first appeared; on 9th, *Triphaena interjecta*, *Larentia didymata*; on 11th, *Trochilium crabroniforme* was found settled in the evening on a hawthorn leaf, not far from a bed of osiers. All subsequent searching failed in discovering more than this solitary specimen. On 16th, *Cilix glaucata* (*spinula*); 18th, *Selenia bilunaria* (*illunaria*), and a larva of *Smerinthus tiliae* were taken. On the 20th, the first of the second brood of *Cyaniris* (*Lycæna*) *argiolus* was seen flying in the garden. On the 21st, *Crocallis elingvaria*, *Hydroecia nictitans*; 22nd, *Epione apiciaria*; 24th, *Phibalapteryx vitalbata*, and during the last week of July several *C. argiolus* were beaten between 7 and 8 p.m., from a hedge, whilst collecting Geometers, another *Triphaena interjecta* being taken on the last day of the month. On August 12th, *Ennomos fuscantaria* was captured at a

lamp, and at sugar a very black *Apamea oclea* (*didyma*), and *Agrotis puta*. Sugar, however, has been almost a complete failure, yielding little more than *Catocala nupta*, *Hydroecia micacea*, and the very common species. During August and September some good *Neuronis popularis*, including one female, were taken at light, and early in the latter month *Ennomos alniaria* (*tiliaria*) and *Anaitis plagiata*. October, as yet, has yielded only *E. alniaria*, *Cidaria miata* and *Ortholitha cervinata* (*cervinaria*).—JOSEPH ANDERSON, Jun., Alre Villa, Chichester. October, 1896.

ABUNDANCE OF *PARARGE MEGÆRA* AND OCCURRENCE OF *APORIA CRATÆGI*.—The feature of the year with us has been *P. megaera*. As in my boyhood, this butterfly has fairly swarmed, and, faithful to its name, not a wall of ten yards in length but had, at its second brood, an equal number of the insects flying about it. *Aporia crataegi* has been almost abundant in its now almost unique locality, whence numerous specimens were brought to show me alive in a single chip box, of course, irretrievably ruined. *Polyommatus bellargus* has been a visitant to my garden this year, the first time in twelve years. *Ennomos autumnaria* has shown up, as usual, in the garden.—SYDNEY WEBB, Dover.

RARITY OF *COLIAS EDUSA* IN 1896.—With an almost frostless winter, such as the last, the absence of *Colias edusa* here is unaccountable. They were certainly not plentiful last autumn, but sufficiently numerous to hope for better things. It would appear, therefore, that, like *C. hyale* and *Argynnis lathonia*, they are not truly British, but that the supply is regulated by the ova deposited here in the spring by Continental travellers. I have only heard of three specimens so far, one in June.—IBID.

BUTTERFLIES IN 1896.—I should call this a good butterfly year. *Cyaniris argiolus* was unusually abundant, and about for a considerable time. *Pararge megaera* was almost common, although, in this district, I have never known the insect other than rare before. *Polyommatus icarus* was abundant everywhere. On the other hand, *Vanessa io* and *Pyrameis atalanta* have been scarce. I saw one fine fresh *P. atalanta* on October 2nd, whilst *Colias edusa* has not been seen.—W. M. CHRISTY, M.A., Watergate, Emsworth, Hants.

C. argiolus (as I have recorded) has been unusually abundant here, so also has *Pararge megaera*, but all other species, with the exception of *Polyommatus icarus*, have been scarce. I have not seen a single specimen of *Pyrameis cardui* or *Vanessa io*. *Euchloë cardamines* was fairly common, the Pierids less so.—J. MASON, Clevedon Court Lodge, Somerset.

COLLECTING IN DEVONSHIRE.—The season here has been, on the whole, a very good one. Butterflies fairly numerous, especially *Cyaniris argiolus*, of which there was a very large (in number) second brood. I have neither seen nor heard of *Colias edusa* yet, no *Pyrameis cardui*, and no *Vanessa io*. The latter, which used to be very plentiful here years ago, has got quite scarce of late years. Sugar, as usual, has been almost a complete failure, but light has been very successful. Many things which are usually very scarce here have been comparatively common. For instance, I have been able to fill up a long series of the following, of which I previously had only an odd specimen or two, viz.:—*Notodonta trepida*, *Arentia flexula*,

Hyphenodes albistrigalis, *Boarmia abietaria*, *B. repandata* ab. *conversaria*, *Lobophora viretata*, *Eurymene dolobraria*, and *Selenia lunaria*, besides taking several *Cleora glabraria*, and other good things.—E. F. STUDD, M.A., F.E.S., Oxtou.

COLLECTING IN YORKSHIRE.—ABERRATIONS OF *TENIOCAMPA* GOTHICA.—The season here has been a very poor one, and, since the middle of June, hopelessly bad. An utilitarian road-surveyor destroyed nearly all my sallows during the winter, and I had to go to Bishop's Wood to get any sallowing. There I had two good nights. *Taeniocampa populeti* swarmed, and *Pachnobia leucographa* was out in fair numbers. Later on, larvæ of *T. populeti* were very plentiful in the wood. Two remarkable specimens of *T. gothica* are worth noting. They were both very small, not larger than *T. pulverulenta*, the ground-colour of one being a glossy pale rose-colour, and the other silvery-grey. Spring larvæ were very scarce; but out of some fifteen larvæ of *Agrotis agathina* I managed to breed eight moths. Sugar has been a complete failure throughout, but now common species are beginning to show up in some numbers. Larva-beating in August was quite useless, two hours' hard work yielding about a dozen individuals, mostly common. *Pleurota bicostella* and *Amphisa gerningana*, generally abundant here, have been extremely rare.—(Rev.) C. D. ASH, M.A., Skipwith Vicarage, Selby, Yorks.

NOTES FROM DURHAM.—I have noticed that *Pieris rapae* and *P. brassicae* have been unusually abundant this year. I have only seen one *Pyrameis atalanta*; whilst a friend of mine stated that he saw *Eucanessa antiopa*, at Ryhope, in April, but, I think, he must have been mistaken. He did not catch the insect, and, not being a collector, I expect he was wrong. It is curious that *Polia chi*, usually quite plentiful here, has been very scarce this year, and the few specimens taken have nearly all been of the aberration *olivacea*. Possibly this may be owing to the wet weather which prevailed here in July, and has since been the predominant sample. Spring larvæ were very plentiful, but autumn larvæ very scarce indeed.—T. MADDISON, South Bailey, Durham.

BUTTERFLIES AT CARLISLE.—Taken on the whole, the season here has been below the average. The Rhopalocera, however, have been fairly well represented. I have never seen so many *Pieris brassicae* before, while *P. rapae* and *P. napi* were also in greater abundance than usual. *Euchloë cardamines* was abundant; I found plenty of larvæ in July, feeding on towering mustard. They fed up very rapidly; some that I took when only half an inch long were in pupæ in less than three weeks. *Argynnis aglaia* was also abundant, but *Brenthis selene* did not occur so numerously as usual. Of *B. euphrosyne* I only took one specimen. It is a rare species here. *Melitaea aurinia* was decidedly commoner than usual, and judging by the number of "nests" of larvæ now to be seen, it will be equally common next year. *Vanessa io* did not turn up; it was pretty nearly exterminated in this district some years ago by picture makers. *Aglais urticae* was well to the fore. *Pyrameis cardui* and *P. atalanta* were both scarce. The latter is generally plentiful with us, but *P. cardui* seldom is. *Pararge megacra* was very common, both in the May and August broods. *Hipparchia semele* was abundant on the coast at Silloth. *Epinephele ianira* occurred everywhere, and so did *Coenonympha*

pamphilus, while *C. typhon* swarmed in its boggy haunts. *Callophrys rubi* and *Chrysopa phlaeas* were moderately common, and *Cupido minima*, *Polymnatus icarus*, *Pamphila sylvarum* and *Nisoniades tages* were fully up to the average as regards numbers.—F. H. DAY, 6, Currock Terrace, Carlisle.

NOTES FROM NORTH DEVON, THE NEW FOREST AND BOURNEMOUTH. OCCURRENCE OF *TRICHOPTILUS PALUDUM*. STRANGE HABIT OF *MACARIA ALTERNATA* PUPÆ.—My time for collecting has been very limited this year. I was in North Devon for a week in June, but, apart from *Torocampa craccae*, I turned up nothing of note. Insects were very early, and *Boarmia repandata*, which is usually scarcely out, was nearly over, all the specimens being worn. I was interested also this year in noticing the occurrence of *Dyschorista suspecta* as far south as the New Forest, and *Hepialus rellida* in North Devon. I also captured the black ab. *nigra* of *Craniophora lignistri* in North Devon. *Lithosia complana* occurred in unusual abundance in this neighbourhood, as also did *Eulepia cribrum* and *Dasychira fascelina*. *Trichoptilus paludum* occurred very sparingly, and *Scoparia pallida* in great abundance. I noticed also a very curious thing in regard to *Macaria alternata*, this being three years' experience of breeding this insect. When the pupæ obtained from the first batch (larvæ usually obtained in June) are kept in the warmth and sunshine, they go over until the next year. But if put into the cellar, where it is dark and cold, they emerge in August. This is a very curious thing, as forcing this species seems to retard, and not hasten its emergence.—PERCY M. BRIGHT, F.E.S., Roccabruna, Bournemouth.

HYBERNATION OF *PYRAMEIS ATALANTA*.—*Appropos* of the hybernation of *P. atalanta*, I may mention that three years ago I found a pupa of *P. atalanta* on St. Herbert's Island, in October. It appeared to me that it meant to hybernate in the pupal stage, as the insect usually appears in September, and continues to fly in October, in suitable weather. I took the pupa home, and placed it in a warm room. In two or three days it turned colour, and soon afterwards produced a fine and very perfect specimen.—H. A. BEADLE, 6, Station Street, Keswick.

SUGARING IN NORTHAMPTONSHIRE.—A flying visit to Northamptonshire showed the sugar patches fairly crowded with moths, for the most part commoners; but there were also *Agrotis obscura* (*varida*), *A. exclamantis* ab. *plaga*, and *Dicycla oo*, with its aberration *renago* to gladden our eyes. The abominable weather we are now experiencing will, I fear, prevent us having *Orrhodia erythrocephala*, or *Eupithecia stenosata*, the latter of which should now (Sept. 26th) be in good condition.—SYDNEY WEBB, Dover.

PLUSIA BRACTEA AND *CIRRHOEDIA XERAMPELINA* AT MORPETH.—I looked for *Plusia bractea* and *Cirrhoedia xerampelina*, and found both very scarce. I only got two specimens of *P. bractea*, and very few *C. xerampelina*. *Polia chi* ab. *olivacea* was also rare. I take *P. chi* on the trunks of ash trees at rest, and *C. xerampelina* at rest at the base of the same trees from 5 p.m. until about 7 p.m.—J. FINLAY, Meldon Park, Morpeth.

REFLECTIONS AND QUERIES ON THE VALUE OF RARE BRITISH LEPIDOPTERA.—With reference to "John Bull's" further remarks on this subject (*ante*, p. 113-4), his speaking of the year 1858 as being "in the mists of antiquity," probably explains his not knowing anything about those distinguished entomologists, Messrs. T. and W. C. (J. B. incorrectly

writes it "C. W." on p. 113) Boyd, the former of whom has been a Fellow of the Ent. Soc. London, since 1852, and the latter was so from 1867 till 1894. There is no reason why he should be puzzled by the list of localities for *D. ramburialis*, given in Leech's *British Pyralides*; Mr. Leech obviously received information about unpublished captures, and entered the localities where they were made. An author would indeed be behind the times if he had to depend for localities entirely on published records, for nowadays those of us who are "in the swim" know additional localities, beyond those published in the magazines, for numbers of rare British species. I am fully aware that a good many *reputed* British specimens of *D. ramburialis* and *E. catalaunalis* (as well as of most other species that are very rare in this country) have passed through the sale rooms in the last 20 years, and equally well aware that an enormous percentage of them was imported from the Continent, and that neither species is a "resident native, in sufficient quantities to supply the demand." No one would dispute this last remark, and I may add that I do not believe either insect to be a resident native at all, but consider both to be occasional visitors only, which cannot continue their race in England for more than perhaps a generation or so. All this makes no difference to the statements in my note (*ante*, p. 67), in which I showed that the reason why both species are considered British is because examples of both have been captured in Britain. *Sterrhia sacraria* and plenty of other species are unable to permanently establish themselves here, but they must not on that account be excluded from the British list.

The answer to "John Bull's" question about *Mecyna polygonalis* is so simple, that one wonders at his asking it. The two individuals in the Tugwell collection realised 95/- and 63/- respectively (the difference in price marking the difference in condition), because it was well-known that they were genuine British specimens, taken by Mr. Tugwell himself in Kent, whereas the example in the Fry collection fetched, with many other insects added, only 16/-, because no one, whose opinion was likely to be correct, believed it to be British; it was catalogued as coming from Warren's collection, which was certainly not the case, for Mr. Warren had no specimen, and the fact of its having been in Waring's collection was considered no guarantee of its being British.

I am sorry to have to dissent entirely from "John Bull's" dictum that "no professional collector who sells *O. lunaris*, and equally rare species, without recording such, can be above suspicion." I know a few professional collectors who are regarded by all competent judges to be absolutely reliable and above suspicion, and of whom the captor of the unrecorded Brighton specimen of *O. lunaris*, in the Fry collection, is one, who never record their captures, for the reason mentioned in my first note, *viz.*, that they know they can get as good a price for them without doing so; the fact of the matter is that they have plenty of customers who know them to be trustworthy, and will at once give them large prices for any rare insects they take. And it is extremely fortunate that this is so, for if "John Bull's" statement were true, a published record would mean so much more money into a dealer's pocket, and the dishonest dealers would be constantly sending up to the magazines notices of fictitious captures in order to secure larger prices, and an increased demand for specimens imported from the

Continent, and offered as "genuine British." It is even easier to concoct false records than to import specimens, and it would be quite impossible for an editor, especially if he was not thoroughly "in the know," or for an author searching the magazines for published localities, to be able to sift the false from the true records.—A COUNTRY COUSIN. Oct., 1896.

SALE OF MR. C. A. BRIGGS' COLLECTION OF BUTTERFLIES, SPHINGIDES, ZYGÆNIDES AND PSYCHIDES.—On October 27th and 28th, the collection of butterflies made by Mr. C. A. Briggs sold for a grand total of £420, whilst the SPHINGIDES, SESIIDES, ZYGÆNIDES and PSYCHIDES produced just under £100. High as the prices ruled, there can be no doubt they would have been much higher had not there been so many forms precisely alike. As a rule, there are not more than three or four men who are willing to pay a long price for any particular form of aberration, and each only wants one or two. Several well-known buyers, whom one would have expected to have attempted to enrich their collections with abnormal forms, were notably absent. Some of the chief prices reached were: £3 3s. for a dark ab. of *Papilio machaon*; *Pieris brassicae*, ab. (described *Ent. Rec.*, iv., p. 122), £1 1s.; *Euchloë cardamines*, ♂, with exceptionally pale orange tips, £5; *E. cardamines*, right side male, left female, £4 10s.; *E. cardamines*, right side male, left female, £4 10s.; *E. cardamines*, right side female, left dashed with male colouring, £3 10s.; *E. cardamines*, right side female, left side streaked with orange on upper and undersides, £2 10s.; *E. cardamines*, male, with orange blotch in hind-wing, £3 10s.; *Gonopteryx rhamni*, right side ♀, left fore-wing ♂, with dash of ♀ colouring, hind-wing ♀, with dash of ♂ colouring, £4 10s.; another, left side male, right side female, £5; *Colias hyale*, with dark fore-wings, hind-wings with a pale marginal band, £1 1s. 6d.; *Colias edusa*, ♀ with absolutely spotless margin, £1 10s.; a specimen, fore-wings ab. *helice*, hind-wings typical, £5; another, left side and right fore-wing ab. *helice*, right hind-wing typical, £3 5s. The prices of *Chrysophanus dispar* were: £3, £5 10s., £2 15s., £4 15s., £3 5s., £2 10s., £1 2s., £3 15s. for males, and £2 2s., £3 10s., £5, £1 1s., £2, £4, £3 10s., £1 15s. for females. Aberrations of *C. phlaeas* produced £1 7s. 6d., 8s., 21s., 10s., 11s., 12s., £2 10s., 12s., £2 5s., and £1 apiece, whilst a broken *Lampides boetica* (Andover, Hants, from Elton, Trin. Coll., Cambridge) produced 12s. Gynandromorphous *Plebeius aegon* went for 7s., 6s., 6s., 8s., 8s., 22s. per pair, whilst a pale male went for 35s., and other aberrations for 18s. and 14s. Underside aberrations of *Polygonommatus astrarche* produced £1 12s. 6d. and £3 apiece, whilst three *P. icarus*, left side male, right side female, fetched £3 5s., £3 and £2 2s. each, one, right side male, left female, produced 35s., and then the price dropped to 6s. (for one), and 8s. and 18s. (for two). Other aberrations of this species produced £1 6s., £1 15s., £3 5s., £5 10s., £1 2s., £1 2s., £3 3s., £5 apiece, whilst aberrations of *P. bellargus* went for £1, £1 6s., £1 12s. 6d., £4 15s., £1 1s., £2 15s., £1 5s., £2 15s. respectively, others going for £2 15s. (for two) and £6 (for two). Individual *P. corydon* produced £3 5s. (right side male, left female), £1 5s., £2 10s., and £1 15s., £2, £3 15s., whilst £1 12s. 6d., £1 17s. 6d., £2, £1 7s. 6d., £1 5s., £2, and £2, for two, were also given. A specimen of *Cyaniris argyolus* (right side ♂, left ♀) went for £3 3s.

Two dark aberrations of *Limenitis sibylla* for 10s., were not dear; whilst *Apatura iris* ab. *iola* went (with five typical *A. iris*) for £1 15s. *Euranessa antiopa* produced 8s., 10s., 16s., 18s., 8s., 8s., 10s., 16s., 18s., apiece, and an underside aberration of *Pyrameis atalanta*, £4. *Vanessa io*, with obscure ocelli, £2 and £1 10s.; whilst certain lots of *A. urticae* went for £3 15s. (five specimens), £1 10s. (five). Aberrations of *Melitaea athalia* fetched £4 5s., £1 10s. and £1 2s.; whilst single specimens of *M. aurinia* brought £1 1s., £4 10s. and £1 10s. Aberrations of *Brenthis selene* went for £2, £1 7s. 6d., £2, and of *Argynnis aglaia*, £1 15s., £1 1s. and 12s. A specimen of *A. niobe*, reputed from the New Forest, July, 1868, went for £1 1s.; whilst *A. lathonia* produced 10s., 12s., 20s., 12s., 12s., 8s. and 20s. per pair. The bleached *Epinephele ianira* went for next to nothing, although £7 for one and £2 10s. for two, were higher prices. A pale ab. of *E. tithonus* went for £4 10s.; but splendid series of ab. *arcte* of *Enodia hyperanthus* went for 10s., 7s. and 8s. per lot of 20; and four *S. malvae* ab. *taras* produced only 6s. Among the moths, a hybrid *Smerinthus ocellatus-populi*, went for 21s.; whilst another hybrid (right side male, left side female) produced £3 5s.; a dark aberration of *Sphinx ligustri*, £6 10s.; a *Choerocampa nerii*, £2 5s.; *Deilephila euphorbiae* only produced 12s., 30s., 14s., 14s. apiece, and the prices suggest that at last Raddon's specimens are being appraised at their true value. *D. lineata* produced 12s., 18s. and 8s. (for two); whilst *C. celerio* went for 18s., 16s., 16s., 14s. apiece, and *Sesia sphegiformis* and *S. scoliaeformis* produced just 1s. each; *S. respiformis* went for 12s. and 8s., and *S. andreniformis* at £1 15s. and £3 per specimen. The rest of the prices call for no comment, the Zygaenids, considering their actual value, being almost given away.—J. W. TURR.

CURRENT NOTES.

The first meeting of the "Committee for the protection of British Lepidoptera in danger of extermination," appointed by the Entomological Society of London, was held at the Society's Rooms on October 14th, 1896. Professor Meldola, President of the Society, was in the chair. Mr. C. G. Barrett, F.E.S., was appointed secretary of the committee. Letters from the City of London Entomological and Natural History Society, the North London Natural History Society, and the Leicester Literary and Philosophical Society, expressing warm sympathy with the object of the committee, were read. After discussion of the best methods of securing the objects of the committee, it was resolved to invite information as to species in special danger of extermination, with a view to future action.

The third part of the sale of Mr. C. A. Briggs' collection will take place on November 24th and 25th. This will comprise the "Tigers," including Longley's celebrated specimen (the somewhat similar companion to which fetched £15 15s. in Mr. Vaughan's sale), fine *Deiopeia pulchella*, *Gastropacha ilicifolia*, from Standish's collection, *Laelia caenosa*, *Spilosoma menthastri*, *S. urticae*, *Odonestis potatoaria* etc. The whole of the NOCTUIDES, the fine lot of GEOMETRIDES, and the larger PYRALIDES will also be included in the sale.

The Rev. A. P. Morres records (Sept. 19th, 1896) the capture of a specimen of *Choerocampa nerii*, captured in 1892, at Stoke Henning

(Dartmouth), by the son of a Mr. Owen. Mr. Morres saw the specimen in 1892, on the setting boards. It appears to be a pity that such rare insects are not reported without delay. The Rev. G. Hughes records the capture of *Leucania unipuncta* (*extranea*) in the New Forest, on October 8th of this year. Mr. G. M. Ellison, the capture of a specimen of *Euranessa antiopa*, at Bracebridge (Lincoln); Mr. W. F. Kirby, the capture of several specimens of the same species from "Forfarshire, from the Isle of Skye, and other localities in Scotland." Mr. P. W. Abbott, the capture of *Leucania vitellina* and *L. albipuncta*, at Freshwater.

Mr. Durrant points out that Stainton described (*Ent. An.*, 1860, pp. 144-145) the larva of *Gelechia peliella* as "dark chocolate-brown," etc., and as spinning a web "along the stems of *Rumex acetosella*." Warren then described (*E.M.M.*, xxv., p. 161) the larva as "pale whitish-green in colour, etc." Lord Walsingham has proved that Stainton's original description is correct, and that the larva Warren described belonged to another species; the latter has now been described (*E.M.M.*), and named *Gelechia suppetiella* by Lord Walsingham.

Mr. G. C. Champion states (*E.M.M.*) that "the insect known to British coleopterists under the name *Anisodactylus* (*Harpalus*) *atricornis*, St., is a variety of *A. nemorivagus*, Duftschm., and not of *A. binotatus*, Fab., as hitherto supposed, and Duftschmid's name must, therefore, be added to our list of *Carabidae*, it antedating that of Stephens by twenty years.

Reading of the abundance of *Tortrix viridana* larvæ, Mr. C. W. Dale examined the oak trees on September 14th, and reports (*E.M.M.*) "never having seen better foliage." Did Mr. Dale expect to find the foliage of the oak-trees showing the traces of the feeding of *T. viridana* in the middle of September?

Mr. W. Holland reports breeding *Tiliacea* (*Xanthia*) *aurago* on hornbeam. When newly hatched, the caterpillars buried themselves in the buds. Later they spun the young leaves together and lived, two or three together, in the little tents they formed. By the middle of May they were full-fed, and spun little cocoons amongst the leaves and rubbish at the bottom of the cage. In these they remained six weeks before changing to pupæ.

The death of Mr. Joseph Chappell, at Manchester, is announced in the *Manchester City News* of October 10th, in his sixty-seventh year.

SOCIETIES.

THE CITY OF LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY. —Oct. 20th, 1896. —ABERRATIONS OF *CROCALLIS ELINGUARIA* AND *HIMERA PENNARIA*. —Mr. Oldham exhibited a very pale specimen of *Crocallis elinguaris*, and a female specimen of *Himera pennaria*, with the transverse lines very strongly marked. *HYPSIPETES RUBERATA* FROM CAMBRIDGESHIRE. —Mr. Oldham also exhibited a bred series of *H. ruberata* from Cambridgeshire, which Mr. Tutt said appeared to be identical with the Wisbech form. *RHYSSA PERSUASORIA* FROM NORFOLK. —Mr. Oldham then exhibited a specimen of this Hymenopteron, taken in Norfolk. *SELENIA TETRALUNARIA*. —Mr. D. C. Bate exhibited a female specimen of the summer brood of *Selenia tetralunaria*, which, although

it pupated in June with the rest of the brood, did not emerge until within a few days of October 3rd, when it was found alive in the cage, which still contained the pupæ of that brood. SUFFOLK CAPTURES.—The Rev. C. R. N. Burrows exhibited—(1). A male aberration of *Epione apiciaria*, orange in colour, without reticulations, and with an entire dark purple marginal band. (2). A specimen of *Acidalia subsericata*, taken in August (1896), and presumably belonging to a second brood. (3). A specimen of *Agrotis nigricans*, without markings. (4). *Dyschorista suspecta*, one without spots, but with transverse lines. All were captured in Suffolk in August, 1896. SYRICHTHUS MALVÆ (TARAS) AND PYRAMEIS ATALANTA.—Mr. T. W. Jackson exhibited a specimen of *S. malvæ* with a whitish central blotch on each fore-wing (ab. *taras*, Meig.), from Horsham, and also a bred *Pyrameis atalanta*, with two of the white apical spots large and suffused, a small apical dot near apex of hind-wings, the spots in the red band on the latter being absent. THE FOOD-PLANT OF CARPOCAPSA SALTITANS.—Mr. T. F. Clarke exhibited a sprig of the species of *Euphorbia*, which bears the seeds known as the “Jumping Beans,” showing the “beans” in position. CAPTURES AT SANDOWN.—Mr. Prout exhibited five specimens of *Caradrina ambigua*, captured this year, at Sandown. Mr. Tutt remarked that the species would appear to occur further west than was generally assumed, as Mr. Woodforde had taken it at Exmouth, this year. Mr. Prout further exhibited two specimens of *Leucania albipuncta*, one very red, the other quite grey, = ab. *grisea*, Tutt; also a strongly marked aberration of *Hadena abjecta* of the variegated form, approaching in superficial appearance to *H. genistæ* or *A. gemina* ab. *remissa*. All the specimens were taken at Sandown. RESTING HABIT OF NISONIADES TAGES AND SPILOTHYRUS ALTHÆÆ.—Mr. Bayne asked whether any of the members had seen *Nisoniades tages* at rest at night. He said he had noticed that, when the lantern-light fell on them, they immediately dropped their wings from the orthodox butterfly position of rest to that described as the “penthouse” position. Mr. Tutt, referring to *Spilothyrus althææ*, a Continental species, said that he observed that a very fine specimen rested naturally with outspread wings, much after the fashion of a Geometrid moth, and continued to do so for several days, but that a worn specimen of the same species rested in quite orthodox butterfly fashion. Mr. J. W. Tutt (President) read a paper on “The Antennæ of Lepidoptera; their Structure, Functions and Evolution.”

ENTOMOLOGICAL SOCIETY OF LONDON.—October 21st, 1896.—EMUS HIRTUS IN KENT.—Mr. J. J. Walker, R.N., exhibited a specimen of *Emus hirtus*, L., taken at Gore Court Park, Sittingbourne, Kent, on the 30th May last. GRYLLOUS CAMPESTRIS FROM ITALY.—Mr. W. B. Spence sent from Florence, for exhibition, some specimens of a cricket, *Gryllus campestris*, in small wire cages, which he stated were, in accordance with an ancient custom, sold by the Italians on Ascension-day. PRESTWICHIA AQUATICA.—Mr. F. Enock exhibited a specimen of the curious aquatic Hymenopteron, *Prestwichia aquatica*, ♀, which Sir John Lubbock first captured in 1862, but which had not been recorded since that date until its rediscovery in May, 1896. Mr. Enock said that the male had remained unknown until June last, when he captured several swimming about in a pond at Epping. The male was micropterous, and, like the

female, used its legs for propelling itself through the water. **ABERRATION OF *TEPHROSIA BISTORTATA*.**—Mr. Tutt exhibited a beautiful aberration of *Tephrosia bistortata* (*crepuscularia*), in which the ochreous ground-colour was much intensified, and the transverse shade between the median and subterminal line was developed into a brown band; the transverse basal, median and subterminal lines on the fore-wings, and the median and subterminal lines on the hind-wings, being strongly marked in dark brown. It was taken by Mr. J. Mason, at Clevedon, in March, 1893. **COCOONS AND ABERRATIONS OF *ZYGÆNA EXULANS*.**—Mr. Tutt also exhibited the cocoons, pupal-skin and aberrations of the imago of *Zygæna exulans*. The cocoons were spun upon one another, five in a cluster, and Mr. Tutt stated that the species was exceedingly abundant in the pupal and imaginal stages during the first week of August on the mountain slopes above Le Lautaret, in the Dauphiné Alps, at from 7,000 to 9,000 feet elevation. The pupa-skin was very similar to those of other *Zygænid*s. The imagines exhibited were all aberrations, and consisted of females of the ab. *flavilinea*, with bright yellow nervures; a large male and several females of the ab. *striata*, with the red spots more or less confluent and developed into streaks; also an unique female aberration in which the wing, from the base to far beyond the centre, was entirely crimson. **A STRANGE EFFECT OF PARASITISM.**—Dr. Sharp exhibited a specimen of a lepidopterous insect that had been alluded to in *The Entomologist's Monthly Magazine*, Sept., 1896, p. 201. It was a caterpillar which, having received the eggs of a parasite on the anterior part of the body, the abdomen, nevertheless, went on to the pupal metamorphosis, while the head and thorax remained attached to it in the caterpillar stage. **PIGMENTATION OF PUPA OF *PLUSIA MONETA*.**—He also called attention to some peculiarities in the pupa of *Plusia moneta*, pointed out to him by Mr. Fleet; in this species the pigmentation varies greatly in extent, and is sometimes entirely absent. **THE TSETSE FLY.**—Mr. Blandford called attention to the recent discoveries relating to the Tsetse fly, made by Surgeon-Major Bruce in Zululand, which proved that this insect affected animals by injecting them with a parasitic Protozoon. The disease had spread from wild animals to domestic animals, and the parasite was more widely distributed than was generally believed, and had been found in India and England in sewer rats. He said that Surgeon-Major Bruce had proved that the Tsetse fly was pupiparous, which was of importance as affecting the classification of the Diptera. Dr. Sharp said that, in his opinion, the Tsetse fly would cease to be troublesome with the advance of civilisation. **PUPA-SKIN, COCOON AND EGGS OF *PAMPHILA COMMA*.**—Mr. C. G. Barrett exhibited the pupa-skin, cocoon and eggs of *Pamphila comma*, found on chalk hills, near Reading, by Mr. A. H. Hamm. ***TEPHROSIA BISTORTATA* (*CREPUSCULARIA*) AND *T. CREPUSCULARIA* (*BIUNDULARIA*).**—Mr. Barrett also exhibited, and remarked on a series of both forms of *Tephrosia crepuscularia* and *T. biundularia*, showing an unbroken line of variation from brown to white, and also to grey and black. In addition, he showed several second-brood specimens obtained in the past summer by Mrs. Bazett, of Reading. Messrs. Tutt, Tunaley and Fenn made some remarks on the specimens exhibited, and gave it as their opinion that the two insects were abundantly distinct. **PAPERS.**—Mr. Tutt read a paper entitled, "On the specific identity of *Coenonympha iphis* and *C. satyrion*," and exhibited a long series of specimens. The Rev.

T. A. Marshall communicated a paper entitled, "A Monograph of British Braconidæ. Part VII." Mr. T. D. A. Cockerell communicated a paper entitled, "New Hymenoptera from the Mesilla Valley, New Mexico." Mr. E. Meyrick contributed a paper entitled, "On Lepidoptera from the Malay Archipelago." Dr. Sharp read a paper by Mr. G. D. Haviland and himself, entitled, "Termites in captivity in England."

THE NORTH LONDON NATURAL HISTORY SOCIETY.—Oct. 8th, 1896.—ABNORMAL FORM OF NEMEOPHILA PLANTAGINIS.—Mr. Woodward exhibited an abnormal form of *N. plantaginis*, having the last pair of legs replaced by wings. CAPTURES.—Mr. C. B. Smith exhibited *Macroglossa fuciformis*, *M. bombyliiformis* and *Bombyx trifolii*, from Lyndhurst, *Macroglossa stellatarum* from Cromer, and *Eltopia prosapiaria* from Oxshott. CATOCALA FRAXINI AT STAMFORD HILL.—Mr. Goymour recorded the capture of a specimen of *Catocala fraxini*, at rest, on the trunk of a lime tree, in the Stamford Hill district, on September 27th. The insect measured 4 in., and was in very fair condition.

"TRANSPANTATION—IS IT JUSTIFIABLE?"—Mr. R. W. Robbins opened a debate on this subject. He took a decided affirmative, and maintained that transplantation was not only justifiable in all cases, except when it was practised for fraudulent and dishonest purposes, but generally advantageous. In agriculture, and many other instances, there was no disagreement between himself and his opponent, but the main objections to scientific transplantation appeared to be:—(1). That it destroys the balance of Nature. (2). That it hinders scientific work. But, said Mr. Robbins, the balance of Nature is being inevitably destroyed by man every day, in the ordinary course of his existence. It is perpetually fluctuating in all well populated countries, and the effect of our own small scientific transplantations would practically not be felt among all this fluctuation. Dealing with the second objection, Mr. Robbins said that he presumed the scientific work chiefly hindered by transplantation was the compilation of local lists, and the study of the phenomena of distribution deduced from them. This seemed a serious consideration, but the hindrance was more apparent than real. In a country like our own, the fauna and flora are already so well known that any introduction is quickly recognised as such, and if the introduced species thrives, it enriches our fauna and flora, and provides us with additional scientific material, without creating confusion. An artificially introduced species would have no chance of survival if the conditions were not similar to its native haunts. Moreover, transplantation was often of great use in preserving a rare species, and might sometimes be necessary to ascertain scientific facts by experiment. In conclusion, Mr. Robbins recommended the introduction of pines and conifers into Epping Forest, and the re-establishment therein of *Limenitis sibylla* and *Dryas paphia*, and said that, quite apart from utility, he considered almost all genuine work of this kind justified by the increase of beauty and interest which might thus be provided in the world around us. Mr. Prout opened in the negative. He agreed with Mr. R. W. Robbins, that "Transplantation" was, of course, justifiable under certain circumstances, but objected to it as a practice, and claimed that, unless, from the point of view of a naturalist, it could be proved perfectly harmless, the point of view of the artist, or that of the utilitarian, could not come at all before the consideration of the meeting. He proceeded to contend

that our mission is to study Nature, not to improve upon her. Many of the most important scientific problems in natural history are worked out chiefly or entirely on data of geographical distribution. And no naturalist has any right to hinder, or even risk hindering, the progress of scientific research in the department of which he professes to be a devotee, merely for the sake of some selfish gratification, or even for the sake of giving pleasure to the lovers of variety in natural surroundings. Transplantation without the fullest publicity is an acted lie against scientific knowledge. Transplantation to save extermination is chiefly, or entirely, within the same district. Transplanting to restore extinct forms is indefensible. Accidental transplantation is sometimes inevitable, but that, of course, was not under consideration, and is generally too inconsiderable in extent to do any serious harm. Summing up, Mr. Prout said that biological science demands accurate data of geographical distribution; that transplantation, especially of the more obscure forms of life, can hardly possibly be made so public that all consequent error is avoided; and that only too often, if naturalists do not set their faces firmly against the whole practice, there will be found those who are willing to transplant with the intention to deceive, and a very fruitful source of error and trouble is thereby created. Mr. Bacot said, that with regard to its causing difficulties in settling the geographical distribution of animals and plants, would Mr. Prout consider, because 100 or 1,000 specimens of any given species were to be found in a certain district, that this would prove it to be firmly established in the country? Would he not try and discern if its environment were suitable to it, and whether it might have been transplanted by some agency other than its own, before considering the point settled? After reading a modern work on the distribution of organic life, is it not patent that every portion of the globe must be visited occasionally by winged or finned animals, or seeds, and that there are numberless chances of getting from place to place for species which do not possess these advantages? Was not the crucial question of distribution rather one of suitability of environment and adaptability of the organism, than of actual opportunity of the plant or animal, in one or another stage, to reach any particular destination? There were, of course, exceptions to this, but they were not so numerous as might be supposed, at first consideration. The question being subsequently put to the vote, the meeting decided in the affirmative by 8 to 5.

CAMBRIDGE ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—Oct. 16th, 1896.—Dr. Sharp exhibited a larva, believed to be of a species of *Hepialus*, which is at present doing much damage to vegetation in Northamptonshire; a pupa of *Sphinx convolvuli*, prepared to show the way in which the proboscis is folded in its case; also one of the colonies of "white ants" (*Calotermes domesticus*), exhibited a year ago, "in extremis." He said that one of the individuals had been transformed into an egg-producer, and specimens of the other Termites were seen in the spring carrying the eggs; the small colony had, in fact, established a "substitution queen," after the fashion described by Grassi.

THE NONPAREIL ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—October 15th, 1896.—Exhibits:—Mr. Hockett: a living specimen of *Pyrameis cardui*, which had emerged that day, also a living specimen of *Boarmia gemmaria (rhomboidaria)*. Mr. Lusby: several dwarf

representatives of *Aglais (Vanessa) urticae*, specimens of *Chrysophanus phlaeas*, in which the coppery gloss of the upper wings was of a very light hue. Mr. Harper, on behalf of Mr. Muncer: an aberration of *Pyrameis atalanta*, which was bred from a larva collected on the Hackney Marshes, six weeks ago. The broad red band on the superior wings, which distinguishes this species, was perfectly straight in this specimen, and not angular, as in the type form, on account of the absence of one segment nearest the anal angle. The white spots on fore-wings above the red band were much larger, and not so sharp in outline, giving them the appearance of having been put on with white chalk and then smudged. On the end of the red band, nearest the anal angle, there was a distinct white patch. The red margin on the hind-wings was devoid of the four black spots found on the usual form. At the foremost tip of the hind-wings there was also a clearly marked white spot. A discussion then ensued on the subject of the HYBERNATION OF PYRAMEIS CARDUI, "as some little surprise was felt at Mr. Tutt's doubt on the point (Oct. 1st No. of this magazine)." The general opinion was that this species did hibernate in the imago stage, as in what other way can the appearance of specimens in the early spring be accounted for? Mr. Norman stated that his brother had taken very small larvæ in the late autumn, which, under a microscopical examination, he made out to be *P. cardui*, and this led him to think that this species hibernated in the larval stage.*

SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—Oct. 22nd, 1896.—FOOD-PLANT OF LUPERINA CESPITIS.—Mr. Ficklin bred specimens of *Luperina cespitis* from larva taken on grass stems in the spring. He suggested that their small size was due to their proper food being grass roots, and not the green blades. TEPHROSIA BISTORTATA (CREPUSCULARIA) AND T. CREPUSCULARIA (BIUNDULARIA).—A large number of specimens of *Tephrosia crepuscularia* and *T. biundularia* were shown by Messrs. Tutt, Henderson, Barrett, Auld, Mera, Mansbridge, de V. Kane, Tunaley, H. Williams, and Chittenden, forming such a collection of forms as, in the opinion of all present, had never before been brought together. In reply to Mr. Barrett's re-assertion, based on Mrs. Bazett's captures, that these two were one species, Mr. Tutt read a very exhaustive paper, which will appear in our next number. Mr. Henderson said that he had taken *T. crepuscularia* in the very woods where it was stated, by Mrs. Bazett, not to occur. His experience and remarks agreed wholly with those of Mr. Tutt. The remarks made by the other exhibitors all tended to support the case as put forth in Mr. Tutt's paper. Mr. W. F. de Vismes Kane sent an account of the occurrence of the only species, *T. biundularia*, occurring in Ireland, together with an exhibit of Irish specimens. In reply to the vote of thanks, proposed by Mr. Barrett, and seconded by Mr. Auld, Mr. Tutt said that the idea of species was largely a matter of utility, and as there were two distinct life cycles exhibited by *T. bistortata* and *T. crepuscularia*, it was more convenient to consider them as two species, although they might be very closely allied. NOCTUA DITRAPEZIUM IN YORKSHIRE.—Mr. Montgomery reported that there was

* Some of the members of this society would appear to be rather behind the times, and not to have seen the paper on the subject, *Ent. Rec.*, vii., pp. 110-111, which answers their query. We may suggest that "opinions" in plenty have been published for years. What is wanted are facts. We hope that some lepidopterist will find and exhibit living imagines of this species during December, January and February of the approaching winter.—ED.

considerable doubt about his record on September 24th, that *N. ditrapesium* occurred in Yorkshire.

REVIEWS AND NOTICES OF BOOKS.

MONOGRAPH OF THE BOMBYCINE MOTHS OF AMERICA, NORTH OF MEXICO, INCLUDING THEIR TRANSFORMATIONS AND ORIGIN OF THE LARVAL MARKINGS AND ARMATURE. PART I.—NOTODONTIDÆ, by Dr. Alphæus S. Packard. —Quarto, 292 pp., 49 Plates and 10 Maps.—[Published by the National Academy of Sciences, New York, U.S.A. Price £3.]—This monograph is, without doubt, the best piece of work ever yet done on the Notodonts, and no entomologist who aspires to know anything of the group can afford to be without it. Although the descriptive part deals with American species, it must be remembered that these are, in some cases, so closely allied to the European, that even the descriptions (especially of the early stages) are as interesting to European as to American entomologists, especially as they are illustrated by 49 well-executed coloured plates, and a large number of woodcuts. The ten general chapters with which the work opens are indeed excellent, and without committing ourselves to an agreement with the details of some of the theories discussed, we have no hesitation in saying that they are far beyond anything yet offered on the subject by any writer. We recommend this work as being especially worthy of the most serious attention of all lepidopterists.

ÜBER DIE PALPEN DER RHOPALOCEREN. EIN BEITRAG ZUR ERKENNTNIS DER VERWANDTSCHAFTLICHEN BEZIEHUNGEN UNTER DEN TAGFALTERN, VON ENZIO REUTER. Quarto, 578 + xvi. pp., 6 Plates.—[Published, Druckerei der Finnischen Litteratur Gessellschaft, Helsingfors, 1896. Price 16s.]—This bulky quarto volume is probably the most comprehensive study ever given to the relationship of the Rhopalocera of the world, based upon the consideration of a special structure of the imagines. To enter into a discussion of the contents of this painstaking and monumental work is quite impossible here, but we have no hesitation in asserting that the diagnoses of the various tribes, genera, etc., of the Rhopalocera, have never before received such judicious treatment, and that it is rare to find an author who has so closely searched every possible source of information to compare with his own conclusions. As a result of the author's labours, we find the butterflies divided into two sub-orders:—(1). GRYOCERA (the Skippers). (2). RHOPALOCERA (all other butterflies). The latter are divided into six GENTES, *viz.*, *Papiliones*, *Lycaenae*, *Libytheae*, *Danaidae*, *Satyri* and *Nymphales*. These again undergo sub-division into Families, Sub-families, Stirpes, and Tribes. We find a close relationship between the Papilionids and Pierids maintained, contrary to Dr. Chapman's views, and a close alliance between Lycænids and Erycinids, in accordance with the latter. We find practically our own grouping of the Satyrids, as set forth in our most recent work, *British Butterflies*, upheld, although the author adversely criticises the position we assign to the Apaturids. Our sub-division of the Theclids and the Argynnids also falls in with the author's conclusions. We can congratulate the author most heartily for having brought us a step nearer to the desired end of a rational classification of the butterflies of the world, and recommend this monumental and painstaking work to the attention of all scientific lepidopterists.

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A critical resumé of the arguments for and against *Tephrosia bistortata* (crepuscularia) and *Tephrosia crepuscularia* (biundularia) being considered distinct species.*

By J. W. TUTT, F.E.S.

In his recent paper on "The *Tephrosia* tangle" (*Ent. Rec.*, vol. viii., pp. 76-81), Mr. Prout has shown most conclusively that, of our two closely allied species of *Tephrosia*, the earlier and more or less double-brooded species should be called *T. bistortata*, Goetze, the later and single-brooded species, *T. crepuscularia*. I need not point out that previously *T. bistortata* was known as *crepuscularia*, and *T. crepuscularia* as *biundularia*.

Whether are *Tephrosia bistortata* and *T. crepuscularia* two or one species? This is a question that has been repeatedly asked and answered, and it is almost needless for me to say that there is a remarkable unanimity in the minds of British lepidopterists whose opinions are worth having, that they are two, and not one species. Only three lepidopterists of repute have taken a distinctly opposite view, *viz.*, the Rev. G. A. Smallwood, Mr. R. South and Mr. C. G. Barrett.

The discussions relating to this matter are now becoming somewhat absurd. The whole principle involved, so far as it has any scientific bearing, is purely a matter of definition. Mr. C. G. Barrett, who has repeatedly raised the question of their specific identity during recent years, has never defined his position. If, in his opinion, a "species" can consist of "two distinct races, each with a distinct life-cycle, each with a distinct facies, and one of them presenting, in addition, marked seasonal dimorphism," then we shall agree with him that these may be but one species; but, if he considers that every group of insects with a distinct life-cycle that breeds true to its own group, has a separate time of appearance, and, therefore, does not normally hybridise with the members of any other group, constitutes a species, then there can be no doubt that he is in an utterly illogical position in maintaining that *Tephrosia bistortata* and *T. crepuscularia* are one species.

The progress of science has taught us that, however distinct certain species may be, others must always be in a state of flux, dependent on the degree of evolution they have undergone. These closely allied and

* Paper read before the South London Entomological and Natural History Society, October 22nd, 1896.

not completely differentiated species will always give us individuals which our training fails to locate with certainty to one of two particular species. Certain Melitæids, Hesperids, Erebiids, Agrotids, Larentiids, Zygenids, etc., will at once occur to all entomologists who are not purely British collectors. Mr. W. H. B. Fletcher has crossed, *inter se*, *Zygæna trifolii*, *filipendulæ* and *loniceræ*, and their hybrid progeny is fertile. Are we, therefore, to consider these as one species? *Smerinthus ocellatus* and *S. populi*, *Amphidasys betularia* and *A. strataria*, *Polyommatus corydon* and *P. bellargus* are in somewhat similar case. But the two insects under consideration do not even occur (except very occasionally) at the same time. There is no suspicion of their hybridising. Their life-cycles are separate and complete. Each produces its own kind. They are purer species from this point of view than any of the above-mentioned insects.

Many errors have been committed by those who do not know both species in a state of nature. The opinions of such are obviously excluded at once from consideration. Another source of error (and perhaps the most vital one) is the general ignorance of lepidopterists of the remarkable summer brood of *T. bistortata*. Few entomologists know the individuals of this brood well enough to draw conclusions concerning them. We do not wish to blame lepidopterists who have fallen into error owing to the misleading statements in Newman's *British Moths*, except so far as we regret that they have not corrected the errors by observation of the facts for themselves.

Attention may now be directed to a few historical details, and for this purpose we will stick to the old synonymy, calling the early and double-brooded species *crepuscularia* (= *bistortata* of the earlier part of this paper), and the later, single-brooded species, *biundularia* (= *crepuscularia* of the preceding part of this paper).

In *The Entom.*, xix., p. 99, we pointed out that Newman states in his account of *T. crepuscularia*:—"Yellow-brown tinge; appearing in April," and of *T. biundularia*:—"Occurring in April, and generally again in July." Both these statements evidently refer to the early species. Stainton describes *bistortata* as *laricaria*, and says that it occurs from "the end of March to the beginning of May," whilst *T. crepuscularia* (Stainton uses the correct name for the later species, according to Prout's later determination) is given as appearing in "April and beginning of May." With such data as these to go on, it is no wonder that those of our collectors whose libraries begin and end with the *Manual* and *British Moths* (and perhaps only one of these), continually exercise their minds on a matter which is as clear as noon-day to all those who are *au fait* with current literature, and study entomology as well as collect insects.

There is no need for me to go deeply into the matter of dates. Suffice it to say that the double-brooded *crepuscularia* occurs normally in March and July, and the single-brooded *biundularia* in late May. Wide variations must necessarily be allowed when one compares the dates for such years as 1888 and 1893, but the relative times for any given year will be found to be maintained.

To those who have not bred both species, the appearance of the specimens of the second brood comes as a revelation, and to those who are not particularly apt at distinguishing critical characters, these specimens are often a cause of stumbling. Such a want of

critical faculty is evident in a note by Mr. T. B. Jefferys, of Clevedon (*Entom.*, xxi., p. 237), where it is assumed, on the most slender data, that "the early and late forms are one and the same brood," although, strangely enough, he makes a reference to the seasonal dimorphism of the undoubtedly double-brooded *Selenia bilunaria*, a species, the seasonal dimorphism and times of appearance of which run remarkably parallel with those of *T. crepuscularia*. Another similar critical failure occurs when Mr. J. Harrison (*Entom.*, xix., p. 160) states that he fails to separate the specimens of the second brood of *T. crepuscularia*, taken in the New Forest in July, from the specimens of *biundularia*, taken at Barnsley, in May. He states that "he fails to see any perceptible difference." One would certainly not suggest that Mr. C. G. Barrett is wanting in critical ability; but all lepidopterists know that the keenest men will sometimes go astray in forming a hasty conclusion from insufficient material, especially when one has already preconceived ideas about the subject in hand. This is the only explanation that I can offer to account for Mr. Barrett's marvellous statement (*E. M. M.*, xxxii., p. 229):—"The second brood of the brown *crepuscularia* is obviously *biundularia*."

Yet another factor comes into play. The superficial similarity in ground-colour of the second brood of *T. crepuscularia*, to that of the only brood of *T. biundularia*, has led many lepidopterists, who are quite convinced that we have here two species, into the error of supposing that the second brood of *T. crepuscularia* is, in reality, a second brood of *T. biundularia*. I gathered recently, in conversation, that this was the opinion of that excellent lepidopterist, Mr. C. A. Briggs. Doubleday warned entomologists on this point. He wrote, in a letter (*Entom.*, xix., p. 161), dated Sept. 12th, 1861:—"(*crepuscularia* has a second brood. . . . Some specimens of the summer brood of *crepuscularia* very closely approach the spring ones of *biundularia*."

I am not quite sure, but I believe, that Mr. G. T. Porritt was the first entomologist to breed and describe the larvæ of these species. At any rate, I find in 1873 (*Entom.*, vol. vi., pp. 385—386) a description of the larva of *Tephrosia biundularia*. The species was taken by Mr. J. R. Wellman, and the eggs were laid in May, 1872. There is no doubt that the species was true *biundularia*. There is no need to quote the technical description, but Mr. Porritt observes:—"The larvæ were much darker and redder than a brood I had reared to moderate size the year previous, which were much more nearly like the pale-greyish variety of the larva of *crepuscularia*. Probably the larvæ of *biundularia* vary as much as do those of that species." Now, in 1871, Mr. Porritt had described (*E. M. M.*, vol. viii., p. 209), the larva of *T. crepuscularia*, and, at the conclusion of his description, adds the following:—"At the time that these larvæ were changing to pupæ, I was taking the perfect insect of *T. biundularia* at large." Here, then, is an entomologist, who has bred both insects from larvæ, entirely supporting the view that they are distinct species. They had distinct life-cycles, they bred true, and, in short, fulfilled the conditions which we usually require of species.

My article (*Entom.*, xix., pp. 98—101), previously referred to, formed the basis of a series of articles. Mr. Adkin (*Ibid*, pp. 158—159) supported the contention for two species by adducing evidence as to

their behaviour in confinement, and concludes :—"I see no reason at the present time for considering *T. crepuscularia* and *T. biundularia* other than distinct species." Mr. Harrison, who appeared to know only *T. biundularia*, and the second brood of *T. crepuscularia*, and who, to square dates, assumed an allowance of a month later for the times of appearance in Yorkshire, compared with our southern counties, considered them to be one species. A full criticism of Mr. Harrison's note appeared in the *Entom.*, xix., p. 184. The Rev. G. A. Smallwood maintained that Newman and Stainton gave him no help, and quotes a series of letters from Doubleday to Hellins. Under date of October 20th, 1861, Doubleday writes :—"The dark *Tephrosia* is far more difficult to procure than the pale one, being very local in this country," the reference to the "dark" species evidently (from the next quotation) refers only to the more ochreous *crepuscularia*, which is, in its typical forms, darker than *biundularia*, and not to the melanic aberrations with which we are now familiar. On February 5th, 1863, he further writes :—"There is still a mystery about them. I am firmly of opinion we have two species in Britain. Here (Epping) we have nothing but *biundularia*, they never have the ferruginous tint of *crepuscularia*. About Warrington *biundularia* occurs, but they get a dark smoky variety, totally unlike the Scotch *crepuscularia*. In the New Forest, Birchwood, etc., both species occur, but *crepuscularia* is always out three weeks or a month before *biundularia*," whilst on February 23rd, 1863, he adds :—"I have always considered the peculiar rusty freckling as one of the most striking characteristics of *crepuscularia*, which seems to be a very local species in this country" (*Ibid.*, pp. 161-162).

Mr. Smallwood, commenting on these notes, shows distinctly that the difference between the "one species" believers and the "two species" believers is purely a matter of definition, for he writes : "I can see a difference between the double-brooded *crepuscularia* and the single-brooded *biundularia*," and then goes on to diagnose the imagines and larvæ from his point of view, concluding :—"But we want more definite differences than these, and they will, I think, be found in the egg state, if at all." What is this, if it be not a matter of definition ? If an individual will only tell us exactly how much or how little he requires to constitute a species, we will tell him whether, under the conditions laid down, we consider *crepuscularia* and *biundularia* one or two species. Probably the "one species" man is still a believer in the immutability of species, and requires a difference equal to that which separates an ox from a horse, before we may label them species. At any rate, there appears to be little advantage in discussing a question where the non-contents will not define the position they assume. They cannot, however, get away from facts. It is proved up to the hilt that *T. crepuscularia* and *T. biundularia* have distinct life-cycles. It is further certain that there are dozens of lepidopterists who can discriminate between them in the imago state. There are certain broad distinctions between the larvæ. The non-contents acknowledge this, but they say :—"This is not sufficient for us to recognise them as two species." We ask, what would be sufficient, in other words we say, "Define your term 'species' ?" This has proved, so far, too difficult for them, and we would ask whether there is any advantage in prosecuting such an unprofitable subject any further.

Let us examine, now, how far Mr. Smallwood defines (or even explains) his position. He writes (*Entom.*, xix., p. 182) in July, 1886 :—"The view, therefore, that I take at present is, that we have only one species, varying immensely in shade and colour, and that, in the south, where the insect emerges so early as March, we have a degenerate second brood, or half brood in July, but that, in the north, it is uniformly single-brooded. In the south, the early bright-coloured variety (*crepuscularia*), which gives birth to the second brood, has been held to be a distinct species, merely as an opinion, and without any foundation in fact, by Doubleday and some of his disciples." Now, if this means anything, it means that all our specimens from March to May (or June) in the South of England, form one long drawn-out brood, corresponding with the later one in the North of England, while the July brood is simply the result of the early emergence of some of the specimens. Now, in October of the same year, the same gentleman describes (*Entom.*, xix., p. 268) fully the larva (and more shortly the pupa and egg) of the insect we have known as *biundularia*. He then gives us a summary of what he considers the principal forms of the imagines* (which comprises probably three forms of *biundularia* and three of *crepuscularia*), and then adds:—"The moths generally emerge in May, but I have seen it a month earlier, and received it alive this year (a backward year) from Mr. Harrison, of Barnsley, on June 25th. In the South of England a remarkable form or 'sub-species' of this moth appears on the wing in March, and produces a second brood at the end of July. The question, is this a distinct species? will only be solved finally when we know more of the egg and larva of this double-brooded insect. It may prove to be a distinct species. . . . If, on the other hand, it be *not* a distinct species, we have to observe these two remarkable facts, *viz.*, that, in the South of England, the first brood continues to fly from the beginning of March till the end of May (a most unusual duration), and also that a double-brooded variety of the species exists side by side with the single-brooded type, and constantly retains its own economy. In view of these difficulties, and believing, as I do, from the remarkable fineness of Scotch specimens, that this is originally a northern insect, the idea constantly recurs to me, have we here discovered, in this double-brooded insect, an instance of how a *variety*, originated in the altered conditions of a southern climate, develops its own characteristics and habits, until it becomes a separate species? If so, this insect appears to be now in the act of transition, having its own constant characters, which still have not yet developed into any conspicuous or specific differences." There is no need for me to point out how much this final pronouncement of Mr. Smallwood differs from the preceding one of three months before. He now grants that *crepuscularia* is a "sub-species," says that "if it be *not* a species," the facts concerning it are "remarkable," and then concludes that it really is a species in the process of formation, and that, although it has "its own constant characters," these "have not yet developed into specific differences." We are quite ready to accept the view that *biundularia* is a species, and *crepuscularia* is a sub-species, so long as he does not ask us to believe (1) that March

* We disagree with the diagnoses, but that is quite beside the question.—J.W.T.

crepuscularia and May *biundularia* are one brood of the same species, (2) that the May *biundularia* is the second brood of *crepuscularia*, or, (3) that the second brood of *crepuscularia* is typical *biundularia*. In fact, we doubt whether we could have stated our own views so well as he has stated them for us.

Now, Mr. Smallwood having laid his own ghost, we are confronted by Mr. South. He (*Entom.*, xix., pp. 269—272) recognises that the difference of opinion which had arisen was a matter of definition, and that the point in disagreement was—"What constitutes a species?" He then refers to his own series of the species which came from various British localities, and compares individual specimens. "The palest specimen is one of the Wiltshire detachment, taken end of March, and the darkest normal examples are the Perthshire contingent," and so on. He also compares the month of capture of the various specimens, quite leaving out the year of capture, on which everything depends, and after this uncritical procedure, in which, having shown that one of the Wiltshire specimens is the "palest in the series," and another Wiltshire specimen "has a brown tinge," and that "other examples of the Wiltshire group are as like Essex June specimens as this insect from widely distant localities can be," he sums up, "that the insects from both localities are of the same species, and as such I certainly regard them." Mr. South then adds, that "the fact of an insect appearing in the perfect state at three distinct periods of the year is exceptional only in one respect—that is, the first and third flights of *crepuscularia* would appear to be quite independent of the second or middle brood." The rest of Mr. South's note is beside the question, except one remark. This occurs at the end of a speculative exercise, in which Mr. South considers that the day may come when only the double-brooded *crepuscularia* will occur in the South of England, and the single-brooded *biundularia* in the North, and then concludes:—"The British entomologist of the future, who may consider the double-brooded insect of the South distinct from its single-brooded brother of the North, will, perhaps, have nothing more trustworthy than colour and ornamentation to guide him in forming his separate series of each, unless he should consider all northern specimens *biundularia*, and all southern examples *crepuscularia*, without regard to such unstable characters as marking and coloration" (*Ibid*, p. 272). Now, does it not strike you that Mr. South rather gives his case away when he surmises that "the entomologist of the future will, perhaps, have nothing more trustworthy than colour and ornamentation to guide him," considering that he has taken about a page of print to show that colour and ornamentation are, so far, as he can discover, absolutely useless, even at the present time, to separate Wiltshire *crepuscularia* from Essex *biundularia*? And is not the assumption of the "double-brooded insect of the South" in contradistinction to its "single-brooded brother of the North," entirely misleading? *Tephrosia crepuscularia* is not a double-brooded southern species. It is partially double-brooded in our southern counties, and single-brooded in Perthshire, whilst the so-called single-brooded species of the north—*biundularia*—swarms in many localities in the southern counties, and does not reach so far north as Perthshire or Scandinavia, where *crepuscularia* occurs. I am afraid some deeper biological studies will have to be made before Mr. South can hope to

shake the position taken up by those lepidopterists who have studied the insects in all their stages. Juggling with a few captured specimens on the "white" and "brown," and "March" and "June" lines will not do it.

(*To be continued*).

The characters of the eggs of Lepidoptera, as affording a basis for classification.

By T. A. CHAPMAN, M.D., F.E.S.

The strong tendency of all eggs is, no doubt, to be spherical, a tendency that is as obvious in the highest as the lowest groups of animals. It is not, therefore, surprising that this form of egg is very common, or, at least, a near approach to it is common, in the Lepidoptera, and it is, perhaps, no proof that they are lower forms that this is the shape of the eggs of the ERIOCEPHALIDÆ and HEPIALIDÆ, and that in the MICROPTERYGIDÆ it is only so far modified as to be, in many cases, somewhat flat-shaped, by a slight lengthening and narrowing towards the micropylar pole.

In nearly all groups, however, in which the egg is laid on something (a leaf, or what not), it is more or less flattened on the attached side. When we come to examine the nature and extent of this flattening, and its relation to the form of the egg generally, we find it possible to place eggs under one or other of two large classes, one, in which the flattened side is at the antipodes of the micropyle, and which we may regard as being placed in an upright or vertical position on its proper or natural base. The other lies, so to speak, on its side, so that the micropyle is at one end, the proper base at the other, both equally removed either from the upper surface or the attached face.

Though I have suggested the nadir of the micropyle as the proper base of the egg, this idea is really quite conventional, and there is some reason even to suppose that it is erroneous, since the upright or vertical egg is possibly derived from the flat or lateral form, whilst there is little ground to believe the lateral is ever derived from the vertical form.

When we enquire what species or families of lepidoptera possess these two different types of eggs we are met at once with facts that show that the distinction is one of importance. Amongst the *INCOMPLETE* (Micros) we find a great preponderance of forms with flat eggs, but our knowledge of the ova of these is so imperfect that it is safer to pass them by, not, however, without a suspicion that amongst them a variation from a flat to a vertical egg is not uncommon. But amongst the higher forms, or *OBJECTÆ* (Macros) we find in each family that the whole of the family adheres throughout to one form of egg.

We find, further, that those families, which have been for various reasons associated together in our more recent classifications, agree in the type of egg, and it seems highly probable that a classification that so places any particular family is more correct as regards that family than is one that places it otherwise; for instance, Mr. Dyar associates the Notodonts with the Noctuid group, and since both have vertical eggs, he is more probably correct than Mr. Meyrick, who places them amongst groups with flat eggs.

If we consider first the vertical eggs, we find them in Butterflies,

in Noctuids, in Arctiids, Lithosiids, Liparids, Chloephorids, and some others. This grouping of the butterflies can only be objected to by those who still regard them as a group of phylogenetic and classificatory value equal to all the rest of the Lepidoptera, but there is no doubt that their value, as a group, is merely that of one of a considerable number of groups.

If all these groups with vertical eggs are related, to the exclusion of those with flat eggs, we should expect to find some other character in common, which does not occur in the flat-egged groups. Doubtless there are a number of such characters, but the one I have been most struck by is that of the possession by the larvæ of some species of that very peculiar organ, the chin-gland. I have not been able to hear of any flat-egged species possessing a chin-gland, yet it occurs in many species of the Butterflies, the Notodonts and the Noctuids, the three groups that are perhaps most in need of a confirmatory common character.

Since the HESPERIDES are a very low group of OBTECTÆ, it follows that the vertical egg and the chin-gland must have been established characters at an early stage of evolution, before the Heterocerous groups separated from the Rhopalocerous, and probably before they were definitely OBTECTÆ.

When we look at the eggs of the butterflies as a group, we find that the Hesperids and Papilionids have eggs which are simple and smooth, with sculpturing, when at all definite, tending to a hexagonal pattern. In the higher groups they tend to more elaboration. In the LYCENIDÆ they retain a more or less hexagonal network. In the PIERO-NYMPHALIDÆ they reach a pattern of primary vertical ribbing and secondary transverse ribbing, the hexagonal nature of the cells so formed being, however, usually more or less distinct. It is, in fact, rare to find the transverse ribs continuous across the primary ones, they usually alternate between each rib. I cannot at present certainly call to mind an instance without reference to my note-book.

When we come to the MACRO-HETEROCERA with vertical eggs, we find a similar progression from the Notodonts, whose eggs are often not dissimilar to those of Hesperids, to Arctiids and Liparids, which have an obscure hexagonal pattern, but are usually rather smooth, and to Noctuids, which are parallel in their sculpturing with the Piero-Nymphalids. All these vertical eggs, no matter how much they may vary in height, whether they be tall and narrow, or short and squat, are circular in a horizontal section, one namely that is parallel to the base and transverse to the micropylar axis. There is a definite micropylar axis, *a*, but the second and third axes, *b* and *c*, are in no definite position, and are equal to each other. When we come to the flat or horizontal egg, the micropylar axis, *a*, is not vertical to the base, but parallel to it, and there are two other axes, *b* vertical to the surface of attachment, and *c* parallel to it, but at right angles to the other two. These axes, *b* and *c*, are usually of different lengths, and when they are equal, are so, one might say, accidentally, rather than necessarily. The groups that present this form of egg appear to fall into two sections, the Bombycid and the Geometrid. These divisions, though not always very easy to distinguish, and equally difficult to do so by the eggs, still present in the Geometrid section more frequently than in the Bombycid, a harder, rougher egg, and one in which the micropylar end is decidedly narrower than the opposite one.

The Geometrid section includes the GEOMETRIDÆ, BREPHIDÆ, CYMATOPHORIDÆ, and probably the DREPANULIDÆ. In the GEOMETRIDÆ, we find some instances in which the sculpturing of the egg very much resembles that of a Pierid or Nymphalid egg; these are, probably, the highest families of the group, and there seems, in one or two species of these that I have seen, a tendency to assume the vertical position. The great mass, however, have a surface either smooth or rough, by reason of pitting in a more or less hexagonal pattern.

In the Bombycids, including the LASIOCAMPIDÆ, ENDROMIDÆ, SPHINGIDÆ, SATURNIDÆ, etc., the egg is usually very smooth, and equally rounded at each end. In some of these groups, the eggs are laid so as to appear to be vertical, as in *Eriogaster lanestris* and *Utiocampa nevustria*, but the true position here is that the eggs are placed on one another, and not strictly on the twig round which they are laid; a simpler case being that of *Gastropacha quercifolia*, *Endromis versicolor*, and *Saturnia carpinii*, when they are distinctly laid on each other. I have seen some exotic eggs that suggest that this may, however, result in a position difficult to distinguish from a true vertical one, but I have not seen any of this group adopt a ribbing, similar to that of Noctuids or Piero-Nymphalids.

A small collection of Lepidoptera from Lapland.

By J. W. TUTT, F.E.S.

On his return from a trip to Lapland, extending from about July 24th to August 24th, Dr. Chapman handed over his collections to me to deal with. The other Orders were accordingly given to specialists; whilst the following are my notes on the meagre lot of Lepidoptera which came to hand. A very large percentage of these specimens came from Bodö (a place in about $67^{\circ}10'$ N. lat., and $14^{\circ}45'$ E. long.), and were captured on July 30th. Where not otherwise mentioned, it may be assumed that the specimens described came from this locality. Vadsö is about $70^{\circ}15'$ N. lat., and $30^{\circ}45'$ E. long.; Elvenaes is on the South Varanger Fiord, and is about $69^{\circ}50'$ N. lat., and $30^{\circ}55'$ E. long. Dr. Chapman says:—"No butterflies were seen or captured at Vadsö. They were probably very rare, or wanting there at so late a date, but the dull, cold weather experienced there may have had more to do with it. One day at Bodö afforded many specimens, six days at Vadsö not one."

PAPILIONIDÆ. Div.: LYCENIDÆ. Fam.: *Lycaenidæ*.—*Chrysophanus phlaeas*.—A single specimen of an exceedingly bright copper colour (both the fore-wings and the marginal band of the hind-wings). Two small blue spots on hind-wings, just within the coppery margin. Beneath, the hind-wings are very pale grey, except the outer margin, which is faintly orange. *Plebeius argus*.—Ten males. One female without orange marginal spots on fore- and hind-wings. Five females with orange marginal spots only on hind-wings. Seven females with orange marginal spots on both fore- and hind-wings. Of these thirteen females, six have the bases of the fore- and hind-wings distinctly sprinkled with blue scales, three are strongly shaded with blue, which extends almost over the whole of the hind-wings and beyond the centre of the fore-wings (= ab. *argyrognomon*, diagnosed by Staudinger as " φ , supra caerulea"). On the underside there is

considerable variation in the number of the little black spots on both fore- and hind-wings, and also in the development of the orange band in the males, one specimen having most of the usual black spots obsolete. In the females, the orange band is strongly developed, and of a very rich tint on both fore- and hind-wings; whilst the silvery studs in some specimens are magnificently developed. *Plebeius optilete*.—Seven specimens, of which six have the orange spots on the hind margin of the underside of the hind-wings well marked, although the usual silvery-blue marginal studs in them are quite evanescent. One specimen is smaller, and in it the orange marginal spots on the underside of hind-wings are also evanescent. This is, perhaps, Staudinger's Lapland var. *cyparissus*, Hb., which he describes as "minor." So far as size is concerned, the first six specimens do not appear to be less than those I have taken in various Alpine localities, and hence Staudinger's limitation of the type form to "Southern" Scandinavia, and the var. *cyparissus* to "Lapland" would appear to be unwarranted. *Polyommatus icarus*.—A male specimen from Bodö (July 30th), typical above, but pale and faintly marked beneath. The bases of the underside of the hind-wings covered with bright blue scales. Another male specimen, from Elvenaes (August 4th), is of the same form. *P. icarus* was seen at each locality, except Vadsö, always worn, and even tattered, nowhere common.

Fam.: PIERIDÆ.—*Euchloë cardamines*.—One female from Naes, captured July 28th. Of rather small size, but not remarkably so, shaded slightly with dark along the costa from the base to the rather large discoidal spot. The green of the underside of the hind-wings paler than with us.

Fam.: NYMPHALIDÆ.—*Argynnis aglaia*.—One specimen of each sex in fine condition, the ♀ much larger than the ♂. The upper side of both specimens is rather more orange than is usual with us. The striking character of the specimens is an attempt, as it were, to crowd the black markings a little towards the base, and leave a rather wider fulvous band through which the row of small round black spots (rather ill-developed) runs from the costa, near the apex, to the inner margin. The underside of the fore-wings of the male shows the black spots larger than usual, and the silvery spots of the hind-wings rather smaller, otherwise the hind-wings are fairly typical beneath, greenish-fuscous at the base, a yellowish ante-marginal band, and a marginal row of well-developed silvery spots. *A. aglaia* was abundant, but rather worn, at Bodö, and the species was seen at several other places. *Brenthis pales*.—Fifteen specimens captured at Bodö, on July 30th. These consist, apparently, of 14 males and 1 female. One of the males inclines to the ♀ ab. *nigra*, nine of the remaining males and the female are all deeply fulvous in colour, and heavily marked with black. The other four males are paler fulvous, and the black spots are less strikingly developed. The female has a faint suspicion of greenish in the dark shading of the fore-wings. In three of the males, and the one female, the black markings tend to form blotches towards the inner margin of the wing, owing to the union of the two central transverse bands in their lower parts. Beneath, these specimens have the underside of the fore-wings distinctly marked with black = var. *arsilache*, which Staudinger diagnoses as: "Al. ant. subt. nigro-maculatis." The hind-wings beneath are deep red-brown, and almost unicolorous,

but such pale markings as remain are exceedingly silvery and metallic, and not pearly white, as in most Alpine specimens. The four males mentioned as somewhat intermediate between var. *arsilache* and the type, are probably ab. *lapponica*, whilst a male specimen from Elvenaes (Aug. 4th) is also referable to this aberration. Of two specimens captured at Harstad (July 31st), one is a very fine specimen of var. *arsilache*, the other belongs to ab. *lapponica*, whilst a male and female, both fulvous in colour and heavily marked, captured at Odde (July 28th), belong to var. *arsilache*. The form *lapponica* here would appear to occur as an aberration of the var. (or local race) *arsilache*. *Brenthis euphrosyne*.—Two specimens, both apparently males. Both are pale, although one is decidedly more fulvous than the other, the latter very pale, especially in the centre of the wing and towards the base. The paler one is under average size, the other quite up to the average. Beneath, the larger specimen is well marked, the smaller one indistinctly so, especially on the hind-wings.

Fam.: SATYRIDÆ.—*Erbia ligea* and *E. euryale*.—There are four little lots of this (or these) species in the collection. (1). Three large worn typical specimens of *E. ligea*, from the Horre Pass (captured July 28th). (2). Two males and four females, from Odde (July 28th). These are rather less than the Horre specimens, of full colour, and appear to be, both on the upper and undersides, undoubted *E. ligea*. (3). Thirty-three specimens from Bodö (captured on July 30th). These are smaller than the preceding lots, and are most like the specimens of *E. euryale*, which Dr. Chapman, Mr. Lemann, and myself captured at Mendel Pass, in late July and early August, 1895. They have, however, on the whole, a little more of the *ligea* characters about them. The Bodö females are, generally, *E. ligea*. They have well-developed fulvous bands, and the ocellated spots and white band on the hind-wings are more nearly *E. ligea* than *E. euryale*. The males, however, on the upper side, tend rather towards the latter, and some are undoubted *euryale*, being, in fact, quite indistinguishable from certain Tyrolean examples in my collection. The Bodö specimens may be described in detail as follows:—Ground colour very dark, the fulvous bands broad; those of the females rather orange-fulvous in colour. Usually, there are four ocellated spots on the band of the fore-wing. Five males and one female with three spots only, and one male with four on the right and three on the left fore-wing. The spots are variable in size. In three male specimens the spots are very small and blind, whilst others show a gradation until the normal large ocellated spots are reached. The broad fulvous band on the hind-wings is, in some of the females, divided into sections by the dark nervures. A parallel variation in the size and number of the ocellated spots with that exhibited by the fore-wings is shown on the hind-wings. The underside of the fore-wings, has a broad fulvous band, the base rather darker; the hind-wings, with traces of the normal white band on the costa and towards the centre of the wings; the females with this character more strongly developed. The ocellated spots on the underside of the hind-wings are surrounded by fulvous in the males, by orange-yellow in the females. This is a remarkable character, rarely, if ever, developed in the males of southern *euryale* or *ligea*, but found as a rare aberration among the females of the latter. This gives the whole of the specimens captured by Dr. Chapman (at Horre, Odde,

Bodö and Harstad), a particularly *ligea* facies on the underside. (4). Six male specimens from Harstad, captured on July 31st. These are just a trifle smaller than the Bodö specimens, but still of the average size of typical Alpine *eurysale*. The ground colour is duller than the preceding; the fulvous bands broad, and the spots in that of the fore-wing, although not reduced in number, perfectly blind. On the hind-wing one (in four specimens) or two (in two specimens) of the spots only are ocellated. The underside of the fore-wings with a broad fulvous band. The underside of the hind-wings with distinct costal and central traces of the white band, and the ocellated spots are (as in the Bodö, Horre and Odde specimens) ringed with fulvous. On the uppersides these are much nearer *eurysale* than typical *ligea*. [N.B.—Standinger gives *E. ligea* ab. *adyte*, Hb., as a Lapland form. I find on reference to Hübner's figures (759-760), that *adyte* is a form of *eurysale*, with no trace of the white band on the underside of the hind-wing. None of Dr. Chapman's captures belong to this form. Standinger diagnoses Tengström's *eurysale* var. *eurysaloides*, from "Finland," as "ocellis subnullis," and this might be stretched to include the Harstad specimens, which have unocellated spots on the fore-wings. The Harstad specimens, however, are identical with some Bodö specimens, and some of the latter are inseparable from the Odde and Horre (Naes) specimens, which are undoubted *ligea*.]

NOCTUIDES.—*Phaetria ramicis*.—Three pupæ from larvæ found at Vossevangen. *Asphalia glaricornis*.—One pupa from larva found at Elvenaes. *Characas graminis*.—One red-brown male, with yellow stigmata and pale blotch beneath the reniform = ab. *tricuspis*, Esp.; another male specimen is of an unicolorous dirty-grey, with indistinct stigmata, and a paler blotch below the reniform = ab. *obsoleta*, Tutt.

GEOMETRIDES.—*Larentia caesiata*.—One poor specimen of a pale form, with a tendency to have a darker central band to fore-wings (= ? ab. *annulosata*, Zett.). Two other specimens, from Elvenaes (August 4th), are pale grey, very feebly marked, but have the central and outer marginal bands of the fore-wings of a darker hue than the ground colour. *L. caesiata* was seen, sometimes freely, at each locality, but was difficult to catch, and always worn, usually too much so to be of any use. *Larentia didymata*.—An exceptionally pale female specimen, from Bergen. *L. didymata* males were flying in many localities, but accidents happened to the few specimens captured. *Larentia respertaria*, Schiff.—Two males and two females, in fine condition, captured at Bergen. This species must not be confounded with *Epione parallelaria*, which British entomologists used to call *E. respertaria*. This species was very frequent on the tree trunks, etc., near Bergen. *Cidaria populata*.—One male specimen, of a very bright yellow form, from Bodö. Two male specimens, from Vadsö (August 14th), are very slightly suffused. Another bright specimen was captured on the Horre Pass, and a very fine, dark ab. *musauaria* was taken at sea south of Trondhjem. *Cidaria immanata*.—Two specimens (one ♂ and one ♀), of dark ground-colour, with the blackish-grey basal area and the blackish-grey central band separated by a narrow, transverse, reddish fascia; a whitish apical patch, and white antemarginal line; captured at Naes. *Carsia paludata*.—Two male specimens of the bright form, with well-marked transverse fasciæ, and with red patches

towards the outer margin and apex of fore-wings. These are, of course, the var. *imbutata*, Hb., to which most of our British specimens belong. This form was abundant at Bodö, common at Elvenaes. A specimen of this species, from Vadsö (August 4th), is dark unicolorous leaden-grey with very indistinct markings. *Melanippe hastata*.—One pupa, the larva taken at Elvenaes. *Coremia minutata*.—One female specimen, taken at Elvenaes (August 4th). The fore-wings of a creamy grey, with a purplish central band.

CRAMBIDES.—*Crambus ericellus*.—One brightly coloured specimen only, very small in size, from Bodö.

PYRALIDES.—*Scoparia murana*.—One brightly-marked specimen, from Odde.

PTEROPHORIDES.—*Platyptilia chapmani*, n. sp. — There is no doubt this small species is at present undescribed. It comes nearest to *P. pallidactyla*, Haw. (= *bertrami*, Röss.).

The fore-wings are of the usual *Platyptilia* shape, and measure two-thirds of an inch from tip to tip. The fore-wings are divided by a fissure into two lobes, the upper slightly curved on the costa towards the apex, which is sharply angulated. The outer margin oblique and continuous, as if not broken by the fissure; the latter extending about one-fourth of the length of the wing. At the termination of the fissure is a fuscous dot. The inner margin of the wing is curved downwards towards the anal angle. The colour of the fore-wings is whitish-grey, without any markings or dots from the base to the dot at the end of the fissure; the two lobes almost white, except for a narrow dusky costal edge reaching to the apex, and a dusky outer marginal line. The hind-wings, divided into three plumules, of a pale greyish tint, shiny, the fringes concolorous with the wings. The legs are also white. The head and thorax are of the same greyish-white colour as the fore-wings; the abdomen rather darker, almost of the same tint as the hind-wings. The underside of the fore- and hind-wings is entirely without markings. The specimen is a male, and was captured at Elvenaes, between August 4th and 9th.

Mimaesceptilus bipunctidactylus.—A couple of specimens (♂ and ♀) which I should refer to this species, were captured at Odde (July 28th). The ♂ is paler, but the ♀ is a very strongly coloured example.

TORTRICIDES.—*Micodia schulziana*.—One example only, a female, from Odde. The ground colour pale, and the red bands and markings rather more restricted than in British examples. *Aphelia osseana* (*pratana*).—One specimen from Odde, the fore-wings silvery ochreous, with a few scattered black scales. The hind-wings shiny, leaden-grey; fringes white. *Hypermoecia angustana* var. *cruciana*.—One specimen from Odde, with the pale ground-colour of var. *cruciana*, and the dark bands of *angustana*. Var. *obscura*, n. var.—A dozen specimens of this species, from Elvenaes, are very remarkable, and without Dr. Chapman's hint that they probably were this species and were taken flying rapidly over dwarf willow, would have gone unnamed. They are unicolorous blackish-brown, some specimens without markings, but two individuals show slight traces of the bands, which are identical in shape and position with those of the more typical forms. *Sericoris palustrana*.—A well-marked specimen from Odde, with the basal patch, central band and ante-apical mark strongly developed. *Grapholitha geminana*.—One very typical specimen, taken at Naes (Horre Pass).

I sent the MS. of this article on to Mr. W. E. Nicholson, of Lewes, who was with Dr. Chapman during the trip, and asked him to supplement it with his own observations. This he kindly did, and his notes are appended.

Lepidoptera from Lapland.

By W. E. NICHOLSON, F.E.S.

I have read with interest your account of Dr. Chapman's Lepidoptera from Lapland, and I am much interested to learn that he has taken a new species of *Platyptilia*. My own collection adds but very little to that made by Dr. Chapman, and consists of the following:—*PAPLIONIDES*.—*Chrysophanus phlaeas*.—Two male specimens of the same bright copper as you describe in Dr. Chapman's. The pale ashy-grey of the underside is a noticeable feature—from Bodö. *Plebeius argus*.—Four males and four females from Bodö. All the females have orange marginal spots on the upper surface of both fore- and hind-wings, though faint on the fore-wings in two specimens. One is much suffused with blue, and, in all, the orange marginal spots of the underside of both wings are very strongly developed. *Plebeius optilete*.—Two males and five females, from marshy ground above Bodö. I do not find that my specimens are either smaller or paler underneath than my Engadine examples, indeed, they are rather darker on the underside than the latter. I have none of the var. *cypris* for comparison, but I cannot see how the specimens can be referred to that form, though it is said to inhabit Lapland. *Polyommatus icarus*.—One worn male specimen from Bodö. The spots on the underside of the fore-wings, between the discoidal spot and the base of the wing, are entirely absent from the right wing, and are only represented by a few scales on the left, so that the specimen approaches the var. *icarinus*. *Cupido minima*.—One large ♀ specimen from Bodö, except that it is rather larger than usual, it is typical. *Euchloë cardamines*.—I presume that the specimen was captured in the early morning of the 28th July, at Naes, as we reached this place at 11 p.m. on the 27th, and left again at 7.30 a.m. on the 28th. The weather was dull all the time. *Argynnis aglaja*.—A male and a female, in good condition, from Bodö. The species was abundant on comparatively dry peaty ground, close to the town. The specimens agree, more or less, with your description of those taken by Dr. Chapman. *Brenthis pales*.—Six specimens from Bodö (5 ♂ and 1 ♀). They are all brightly fulvous, and rather heavily spotted with black. The female presents less difference from the male than is usual with Swiss specimens. A single female was taken at Harstad, on July 31st, in which the fulvous ground-colour is very rich, and the black markings are all much enlarged, the central row of spots on the fore-wings coalesce, and form an irregular band outside the discoidal cell, giving the insect a striking banded appearance. I have also 3 males and 8 females from Elvenaes, South Varanger, taken on the 6th August. The males approach the form taken at Bodö, but the fulvous marking is rather duller. The females have the fulvous ground-colour much duller, and the black spots are considerably larger than usual. The insect has a superficial resemblance to a dark *B. selene*, and I take it to be Staudinger's var. *lapponica*. The Bodö specimens approach this form, but are not so characteristic. They are all much smaller than the type. *B. euphrosyne*.—One ♀ specimen from Bodö, darker and duller than the type, probably referable to the var. *finjal*. *Brenthis freija*.—This species was not seen on the wing, but I have a single damaged specimen, given to me by the landlady at the hotel at Elvenaes, South Varanger. It had been captured by one of

her children, about three weeks before our visit, when it had been quite common in the birch wood close to the hotel. *Erebia lapponica* had been taken about the same time. *Erebia ligea*.—Seven ♂ and 6 ♀ specimens, all from Bodö. The insect was over on the low ground, near the sea, but might be taken in fresh condition on the 30th July, in the hills at the back of Bodö, at 700 to 1,000 feet elevation. The specimens, though small and dark, mostly approach the typical *E. ligea* of Central Europe, though others show some tendency towards *E. corymbosa*, which probably has but little value as a species. *Colias palaeus*.—One male and one female of this species, taken by Dr. Chapman, who kindly presented them to me, in a marsh, near Elvenaes, South Varanger, August 6th. The male is distinctly paler than the type, but it is also worn. The female has the dark marginal bands paler and narrower than the type, and is certainly crossed by faint whitish lines, but not more so than in some Swiss specimens. The specimens would probably be referred to the var. *lapponica*, Stgr. *Aglais urticae*.—I have also, since our return, bred a considerable number of *Aglais urticae* var. *polaris*, some of which are very dark indeed. The larvæ were collected by Dr. Chapman, at Harstad, Elvenaes, Hammerfest and Tromsø. Most of the pupæ were subjected to temperature experiments, but those which emerged in the temperature of a cool room at about 63° F. (the weather being cool at the time), are very much darker than the type. The dark border of all the wings is rather broader than usual, and the blue spots are very conspicuous, especially on the hind-wings. The fulvous ground-colour is darker than usual, and the black spots are considerably larger, and the inner marginal spot tends to join the central costal spot, giving the fore-wings a banded appearance. One specimen is remarkable as having reached the perfect state with a larval head. Its wings are much crumpled.

I have no moths other than those taken by Dr. Chapman, but I found two larvæ feeding on birch at Elvenaes, which have since turned to pupæ, and which I believe to be *Nyssia lapponaria*.

Hymenoptera from Lapland.

By EDWARD SAUNDERS, F.L.S., F.E.S.

The Aculeate Hymenoptera captured by Dr. Chapman at Vadsö and Elvenaes, from August 4th—9th, are as follows:—♂ *Psithyrus quadricolor*, Lep.; 6 ♀ *Vespa norvegica*, Fab.; 2 ♂, 1 ♀, 1 ♀ *Bombus lapponicus*, Fabr.; 2 ♀, 1 ♀ *Bombus jonellus*, Kirby; 1 ♂ *Bombus agrorum*, Fab.; 4 ♂ *Bombus pratorum*, Linn.; 1 ♀ *Bombus soroensis*, Fab.; 1 ♀ *Bombus* sp.? This last specimen puzzled me. It is too large for a ♀ *B. soroensis*, and yet the cheeks are too long for *B. terrestris*, and not long enough for *B. hortorum*. I fear it is one of those cases where the name must remain in doubt. *Bombus* is a difficult genus to study, and, without the ♂, it is often impossible to name a species. There are, I fear, no special observations to be made on the specimens. They are just like those one would take in Scotland of the same species.

By REV. T. A. MARSHALL, M.A., F.E.S.

Both the Ichneumonidæ are new. The following are the descriptions of the two species:—

Mesoleius compar, n. sp. Subnitidus, subtiliter alutaceus, clypeo apice depresso, in ♀ non emarginato. Area metathoracis superomedia linearis, perangusta, inferius dilatata; posteromedia subcompleta. Segmentum primum apicem versus sensim dilatatum, canalicula obsoleta, foveola basali parva. Alarum nervus transversus analis infra medium fractus. Niger; clypeo, mandibulis, palpis, flavidis; his apicem versus fusciscentibus. Scutellum supra rufum. Pedes c. coxis rufi; tibiæ posticæ subflavescentes vel testaceæ, apicem versus latius fuscae; tarsi postici fusci; calcaria pallida. Long. 4 lin. ♂ Ignotus.

Head transverse, much narrowed behind the eyes, black, except the oral parts, which are yellow. Antennæ rather longer than the body; 1st joint black beneath (not yellow, as in most species). Face beset with pale hairs. Thorax wholly black, alutaceous, except a shining spot under the wings, near the metathoracic suture; lateral areæ of metathorax (spiraculifera and pleuralis) well defined; the superomedia reduced to a mere line, widened at the bottom; posteromedia distinct, rounded, acutely margined: mesonotum subtrilobate, the sutures faintly indicated by shallow lines. Wings hyaline; stigma fuscous; no areolet; radial nervure almost straight. Abdomen subfusiform; 1st segment longer than the hind coxæ, its apex three times as wide as the base; central channel obsolete; basal fovea minute, triangular; 2nd segment shorter than the 1st, longer than broad; 3rd shorter than the 2nd, transverse; none of the segments pale at the hinder edges. Belly and plica ventralis black.

Nearly allied to *auticus*, Gr., *dubius*, Holmgr., etc. Belongs to Sect. II., Divis. 1, A, a, x, +, p. 134, of Holmgr. Mon. Tryph. About nine cognate species are described, several from the Scandinavian peninsula: this sp. agrees with none of them, but is, perhaps, nearest to *furax*, Holmgr., p. 136.

Norway (Bodö), taken by Dr. Chapman, Aug. 4-9, 1896.

Bassus remotus, n. sp.—Lævis, nitidus; metathorax rugulosus, area superomedia elongata, distincta, c. posteromedia confusa. Segmentum primum. ♀ latius quam longius, basin versus angustatum, bicarinatum, coriaceum, punctulatum. Niger, segmento abdominis secundo postice, 3tio toto testaceo. Palpi testacei. Pedes rufi, postici femoribus infuscatis, incrassatis. Long. 2½ lin. ♂ Ignotus.

Antennæ 20-jointed, rather stout, shorter than the body, the first three joints of the flagellum elongate, cylindric, especially the first. Wings hyaline; squamule testaceous; stigma fuscous, triangular; 1st abscissa of the radius only half as long as the 3rd; 2nd obsolete; 3rd quite straight; no areolet. Coxæ rufous; tarsi longer than the tibiæ; calcaria minute. Second abdominal segment transverse, coriaceo-punctulate and black as far as the middle, the posterior half smooth, testaceous; 3rd smooth, testaceous, slightly infuscated at the sides; 4th and following smooth, black, shining. Abdomen sub-compressed towards the apex, perhaps by accident, for the valvula ventralis is pushed down, and the terebra unnaturally exerted, as if by force; this last is curved, and appears now as long as half the abdomen.

I have placed this obscure and isolated species in the genus *Bassus*, as being the nearest, but the 1st segment is narrower at the base than in other species. The incrassated hind-legs resemble those of the allied genus *Orthocentrus*.

Norway (Vadsö), taken by Dr. Chapman, July 30th, 1896.

Trichoptera from Finmark.

By ROBT. McLACHLAN, F.R.S., F.L.S., F.E.S., F.Z.S.

Mr. McLachlan reports on the Trichoptera as follows:—There are about 25 specimens in all, in about nine species. More than one half

are *Limnophilus femoratus*, Zett., mostly of small size. The others are: *Limnophilus griseus*, L., 1 ♀; *Asynarchus*, 2 ♀, not to be determined without the ♂. *Micropterna sequax*, McLach., 1 ♂; *Halesus tessellatus*, Ramb., 1 ♂; *Apatania stigmatella*, Zett. (?) 1 ♀; *Molanna palpata*, McLach., 1 ♀; *Hydropsyche nevae*, Kol., var. *jennica*, McLach., 1 ♂; *Plectrocnemia conspersa*, Curt., 2 ♀; *Rhyacophila nubila*, Zett., 2 ♂.

Note on a few Norwegian Insects.

By W. F. KIRBY, F.L.S., F.E.S.

I have just been looking over the Norwegian insects that you gave me the other day, from Dr. Chapinan's collection, made in August last. I identify them as follows:—COLEOPTERA.—*Agabus elongatus*, Gyll., Hab.: Bergen. *Coccinella 7-punctata*, L., Hab.: Bergen. ODONATA.—*Leucorhinia rubicunda*, L., Hab.: Elvenaes, Aug. 6th. *Somatochlora alpestris*, De Selys, Hab.: Elvenaes, Aug. 6th. *Aeschna juncea*, L., Hab.: Elvenaes, Aug. 6th; and Bergen. ORTHOPTERA.—*Stenobothrus bicolor*, Charp., Hab.: Bergen. *Podisma frigidum*, Boh., Hab.: Elvenaes, Aug. 6th. Some of these are good species, and I was glad to get additional specimens, although none were actually new to the Museum collection.

Collecting Coleoptera in the New Forest, Whitsuntide, 1896.

By FRANK BOUSKELL, F.E.S.

The most noticeable feature compared with last season was the abundance of hawthorn blossom, where only an odd bush was then to be seen, this year, appeared a mass of white. Attention was turned to beating the blossom, one *Elatér elongatulus* dropping into the umbrella, *E. sanguinicollis* and *E. pomonae*, both of which were taken last year, were absent. I fancy the best plan to get *Elaters* is to search for them in their winter quarters, but, owing to the early season, searching under bark was unproductive, *Clerus formicarius* only turning up. Two or three of the rare *Ischnomera sanguinicollis* were secured, while the commoner *I. caerulea* and *Oedemera livida* were fairly abundant. *Cetonia aurata* was also on the blossom, with many common things which, though useful to a Midland collector, are hardly worth recording, such as *Luperus flavipes*, *Cryptocephalus lincoln*, *C. julia*, etc. Beating oak, near ants' nests, produced a good series of *Clythra 4-punctata*, which is found in both the larval and perfect state inside the nests. A few *Rhynchites pubescens* turned up, and *Calosoma inquisitor* was exceedingly abundant; it seemed that the Forest specimens were both larger and brighter coloured than our Leicestershire ones. *Silpha 4-punctata* was as common as usual. By beating pine a few variable *Myzia oblongoguttata*, and one fine form of *M. ocellata*, with one spot only on each elytron was secured.

On the outskirts of the Forest (I will not give any nearer locality, for obvious reasons), with Mr. W. C. Jackson, I found *Carabus nitens* quite abundant. By the way, is it generally known that toads are partial to this beetle? We found the remains of 25 in the droppings of one, rather a wholesale order. Not very far away, *Cicindela sylvatica* was plentiful, and hard to capture, owing to its swift flight.

Amongst the Longicorns we had good luck, a great number of species, but, as a rule, few individuals being taken, including *Callidium variabile*, one brown form on the thorn blossom. Last year, I got the blue, black, and brown forms all out of one stump. *C. alni* (1), *Clytus arietis* (common), *Clytus mysticus* (6), out of holly bloom, *Liopus nebulosus* (1), on bracken, *Pogonochaerus dentatus* (1), out of thorn, when in the umbrella it looks just like a bit of dead stick. *Polyopsia praeusta* (4), *Iliagium inquisitor*, *R. bifasciatus* (odd specimens), *Torotus meridianus* (1), *Strangalia armata* (a few), *S. nigra*, sweeping mowing grass (3), *S. melanura* (3), *Leptura livida* (1), *Anoplodera 6-guttata*, on thorn and holly blossom, also by sweeping, all four species of *Grammoptera* on thorn, but only one specimen each of *G. analis* and *G. praeusta*. I mention these, as to take one-third of our British species in three days is decidedly unusual. I searched hard where last year I found a fine specimen of *Asemum striatum*, crawling on a pine stump, without avail. I believe that it was the second English record, although it is not very rare in Scotland. It is curious no more should be found in the Forest, where pine and fir enclosures abound.

On sallows, *Goniotena riminalis* abounded, the black markings being very variable in size, and quite obsolete in some specimens. On water plants, a few *Donacia thalassina* were found, with plenty of *D. sericea* and *D. simplex*; and on yellow composites, *Cryptocephalus aureolus*.

Whilst beating oak, naturally a few lepidopterous larvæ came down. *Taeniocampa miniosa* (common), *Asphalia ridens* (a few), and *Catocala sponsa* (8), off the trees almost denuded of leaves. Although I have worked the same place in other years, I have failed to get more than an odd one before, and then it has been crawling down the trunk. Is it that it is a high feeder, and that this season, owing to the ravages of Tortricid larvæ, it has had to seek food lower down? Shortness of food tended in this case to produce dwarfs, the specimens which hatched being much smaller than usual. As I conclude mere lists of captures are of no interest to your readers, I refrain from mentioning the 150 other odd species which I observed.

Critical Notes on the specific identity of *Bombyx quercus* and *Bombyx callunae*.

By J. W. TUTT, F.E.S.

In his paper on *Bombyx quercus* and *B. callunae*, read before the City of London Entomological Society, in May last, Captain Thompson came to no conclusion as to how far these insects were the same or distinct species. To the impartial evidence he offered us, I should like to offer a few criticisms, taken from the records of the *Ent. Mo. Mag.* and the *Ent. Rec.* (which he seems to have overlooked), and also based on my own observations.

(1). Captain Thompson supports Newman's statement that *B. callunae* occurs in "May." That it does so occasionally is certain, but I would suggest that late June is its more normal time. Referring to the date of emergence, Mr. Collins writes (*Ent. Rec.*, i., p. 130):—"I picked up a good number of *Bombyx callunae* on June 27th, at Rixton Moss"; whilst Mr. Milburn, of Darlington, writes (*Ibid.*, p. 133), that on

June 25th, 1890, he took some larvæ of *Bombyx callunæ*, about three parts grown, and an imago of the same species. My own specimens have always emerged in late June. Mr. Finlay (*Ent. Rec.*, iii., p. 7), says the eggs are laid at the end of June or beginning of July.

(2). Captain Thompson says:—"The larva of *B. quercûs* is full-fed at the end of May, pupates in June, and emerges in July, whereas *B. callunæ* is full-fed at the end of August, spins its cocoon in September, hybernates the second winter as a pupa, and emerges in the following May." Now, Mr. W. Mackmurdo writes (*Ent. Rec.*, ii., p. 186), that he found a full-fed larva of *B. quercûs* on August 26th, 1891, in the Warren, Folkestone, which spun up in due course, and remarked on the lateness of the find. Mr. Barker reported (*Proc. Sth. Lond. Ent. Soc.*, 1891, p. 141) that he had taken larvæ at Folkestone the same autumn (1891), that these had pupated later in the autumn, and added that in the same year "many larvæ of *B. quercûs* were reported as having been taken full-fed in the Warren, at Folkestone, during August and September." Mr. Bond records (*Ent. Mo. Mag.*, p. 36) that from pupæ received from Staffs., which had gone over the winter as pupæ, one of six specimens which had emerged in June was "certainly the form called *quercûs*." Mr. Daws, of Mansfield, Notts., writes (*Ent. Rec.*, i., p. 109):—"I have had a *B. quercûs* lie over two seasons, and then produce typical *quercûs*, not var. *callunæ*, in the early spring." This bears very strongly on Captain Thompson's contention (*Ent. Rec.*, viii., p. 160). Mr. Tunaley records (*Ent. Rec.*, viii., p. 167), that he found 29 cocoons of *B. quercûs* at the bottom of a hawthorn hedge, at Derby, on February 14th, 1865. Mr. Beadle states (*Ent. Rec.*, vi., p. 278) that on Skiddaw the larva of *B. callunæ* is full-fed in June. Mr. Pitman, too, brings the appearance of *B. quercûs* and *B. callunæ* within a fortnight of each other. He states (*Ent. Rec.*, vi., p. 34) that the larvæ of *B. callunæ* hatched a good fortnight before those of *B. quercûs*. He does not, however, tell us whether *callunæ* laid first, or whether he obtained ova at about the same time. Mr. Merrifield (*Trans. Ent. Soc. Lond.*, 1892, p. 40) writes:—"I believe temperature applied early in the larval stage has effected a complete conversion as regard the habits of these insects." The following is rather a strange note. The time that the larvæ were captured would suggest *B. callunæ*, the time of emergence *B. quercûs*, but the note by Mr. Daws, from the same locality (Mansfield), suggests that the species may really be *quercûs*. The note relates to the time of appearance, and Mr. Richard Tyrer, of Mansfield, writes, on Sept. 21st, 1867:—"A female (*Lasiocampa quercûs*) has just made its appearance in a friend's breeding-cage. The larva was taken, with two others, last September, and they spun up about the middle of the month. Is it not an uncommon occurrence for the insect to remain in the pupa state a full year, and to emerge at this season? The two other pupæ are awaiting their change, when will they appear?" The appearance of either *B. quercûs* or *B. callunæ* in September, after being in the pupal stage twelve months, is sufficiently remarkable.

(3). As to the fact of *B. quercûs* going through its metamorphoses in a year, the experience of Mr. Daws, Mr. Tunaley, and Mr. Barker, just recorded, all oppose it. The two former gentlemen talk of typical *B. quercûs* going over the winter as pupæ. As to *B. callunæ* taking less than two years, Mr. Finlay writes (*Ent. Rec.*, iii., p. 7):—

"The usual period required, in the neighbourhood of Morpeth, for *B. callunae* to pass through its different transformations is two years. The eggs are laid at the end of June, or beginning of July, and hatch in from 10 to 18 days, according to temperature. The larva during the winter is about an inch and a half long. The full-fed caterpillar spins up in June or July, and, if the weather is very fine, a few insects may occasionally emerge on the moors at the end of August; but the usual time of emergence is about the end of the third week in June in the following year." Again, the specimens of *B. callunae*, exhibited by Mr. C. Nicholson, in May last, were from ova laid in July, the imagines emerging in November of the same year, a period of about four months.

(4). As to the food-plants, it is probable that ling is the most natural food for *B. callunae*; but I understand that Mr. C. Nicholson obtained his specimens from a district where there was no ling. The following note as to the food-plant of both *B. quercus* and *B. callunae*, by Mr. G. T. Porritt, is interesting. He writes:—"I have once or twice been asked whether the larva of *B. quercus* will eat heather, and this season, having collected, on the Lancashire coast, a few larvae of that species, I supplied them with heather (*Calluna vulgaris*), and they immediately began feeding with apparent relish, although an abundance of fresh hawthorn (on which they had previously fed) had just been taken out of the cage. Of course, it is well known that *callunae* will eat almost anything that *quercus* will" (*E.M.M.*, vi., p. 117). Again, Mr. F. Hutchinson writes (*E.M.M.*, vii., p. 17) that *B. callunae* will, in confinement, feed well upon ivy. Mr. O. S. Wilson (*E.M.M.*, xix., p. 165) gives Portugal laurel as the food-plant of a larva of *B. quercus*, captured in May, when half-grown, reared to full growth on this plant, spinning up on June 22nd, and emerging on August 17th, the same year (1882); whilst Mr. Elliot (*E.M.M.*, xix., p. 237) records the rearing of a fine series of *B. quercus* var. *callunae*, the larvæ being fed exclusively on poplar and hawthorn. Mr. Prideaux (*Ent. Rec.*, v., p. 213) reared forty specimens of *B. quercus* from ova laid in August, 1886, and fed throughout the following winter on bramble. Mr. Pitman says (*Ent. Rec.*, vi., p. 34) that both *B. quercus* and *B. callunae* feed on plum, whitethorn, blackberry, and laurel.

(5). I observe that Mr. Merrifield (*Trans. Ent. Soc. Lond.*, 1892, p. 39) talks of *B. quercus* and *B. callunae* as the "southern" and "northern" forms respectively, and Captain Thompson says that Mr. C. G. Barrett classes them as the "northern race" and "southern race." This is deplorable, because it is so utterly misleading as to actual facts. The distinction seems to be a matter of altitude, rather than latitude or longitude, although the distribution of *callunae* in our more northern latitudes, being usually in places that exhibit an increase of altitude, the latitude, rather than the altitude, is apt to be considered as the important factor; but the high-lying moorlands of the Isle of Wight, Hampshire, Cornwall, Devon, Wales, etc., produce *B. callunae* as marked in character as those from the Scotch moors; whilst Dumfries, Lancashire and Yorkshire, at the sea-level, produce typical *quercus*. Birchall says (*E.M.M.*, iii., p. 35) that "*Bombix quercus* var. *callunae* is abundant in Ireland, and that he has not met with the true *quercus* there." Hellins says that "*quercus*, of course,

occurs at Epping and in the London district, and is the form taken at Cambridge, but, as yet, we cannot say whether it prevails throughout the counties eastwards of this line." "*Callunæ* prevails universally north of Manchester, also westwards from Hampshire to Cornwall; but we have no certain information yet about Wales" (*E.M.M.*, iv., p. 15). Bond says:—"I have this season, pupæ from Staffordshire, which have been lying by all the winter. The imagos are now appearing, and of six individuals which have already emerged, one of them is certainly the form called *quercus*, and differs in no respect from those that only passed about a month as pupæ bred some seasons ago, from Cambridgeshire" (*E.M.M.*, iv., p. 36). Bond further says that he can "assert that *quercus* does occur in Ireland, for, some years ago, I captured three specimens near Queenstown, and saw many more on the wing, and I still have an example in my cabinet." Porritt also shows (*E.M.M.*, vi., p. 191) that Hellins' notion of the distribution of the two insects was more or less incorrect, for he records the larvæ of *B. quercus* as common on the sandhills at Lytham on May 17th and 18th, 1869. Again, in 1870, Porritt writes (*E.M.M.*, vii., p. 17) that on April 15th, at Southport, he found the larvæ of *B. quercus* common, more especially on the south sandhills.

(6) Captain Thompson thinks that the wing rays and the shape of the curvature of the bands are of "great use in enabling the student to distinguish the races at once." In a general way, I quite agree with this, although neither character will bear any close examination. Hellins says (*E.M.M.*, iv., p. 15):—"I suppose it is generally known that the distinction between *quercus* and *callunæ* really lies in the different curves of the pale fascia on the wings of the moths, and not so much on the greater or less depth of colour, nor on the length of time passed in the pupa state."

I think that I have now drawn attention to the leading points that have made lepidopterists generally accept, or, at least, silently acquiesce in, the general principle laid down by Bond, who (*E.M.M.*, iv., p. 36), "after some years' attention to the subject," was "inclined to believe that *quercus* and *callunæ* are only forms of one variable species."

One of the most important scientific facts relating to these insects was quite overlooked by Captain Thompson. This was Mr. Merrifield's temperature experiments (*Trans. Ent. Soc. Lond.*, 1892, pp. 39-40), and the conclusions that he deduced from them. The pupæ of *B. quercus*, which were experimented upon, came from Windsor, those of *B. callunæ* from Perth and Aberdeen. He found that "the same general result obtained in both forms, that is, those at the higher temperature were lighter than those at the lower temperature. This particularly applies to the males, the females varying less, but in both males and females, the forced ones have a reddish tint, which is wanting in the others. In some cases the effect of temperature is so considerable that I think some of the forced *callunæ* would, so far as regards colouring, be classed as *quercus*, while the individual *quercus*, brought out in 71 days at the lower temperature, is very dark for *quercus*. I think these experiments tend to show that the southern form and its northern *var.* are respectively varieties of so fixed a kind when they reach the pupal stage, that it is probably only in exceptional instances, if at all, that temperature could convert the one form so far as its appearance is concerned, into the other."

I have attempted to show from the records concerning these species that the conclusions of Newman have been proved to be largely erroneous by writers to the *Entom. Record*, and to the *Ent. Mo. Mag.* There is one point to which I personally take objection, and that is the analogy that Captain Thompson draws between *B. quercus* and *B. callunae*, on the one hand, and *Tephrosia bistortata* and *T. crepuscularia* (*biundularia*) on the other. Those who fail in distinguishing the latter are either working on insufficient material, or on erroneously named individuals. Their life-cycles are complete and separate, and their specific distinctness may be looked upon as established by natural environmental causes. It is not so, I venture to think, with regard to *B. quercus* and *B. callunae*. The opinions of all those lepidopterists whose facts and observations I have quoted tend to show that, at present, the insects are in a state of flux, distinct even to the extent of species, when *B. callunae* of Aberdeenshire are compared with *B. quercus* of Kent, but questionable where the two insects overlap, and some particular character of the one form is developed (sometimes with an individual or two only in a brood) in a brood which gives the general characters of the other. Mr. Merrifield's results go to prove the specific distinctness of Aberdeen *B. callunae* and Surrey *B. quercus*, but thirty years ago, Dr. D. Sharp very clearly defined the position of *B. callunae* with regard to *B. quercus*, when he defined the former as a "race" of the latter. He said a "race" is "generally found under evidently somewhat different circumstances to the type form of the species to which it belongs, and is distinguished by constant though slight characters, but specimens forming the passage from the race to the type occur, though in many cases very rarely." He then instances *Bombix callunae* as an example of a race, and goes on to say:—"A race, it will be seen from the definition I have given of it, approaches very nearly in validity to a species; indeed, the connecting forms are the only reason that can be satisfactorily assigned for its non-distinctness. It is, in fact, a species nearly formed; and it is probable that, under a somewhat greater differentiation of the circumstances in which the type and race live, intermediate examples would cease to occur, and the race would become a distinct species" (*E.M.M.*, iv., p. 70). I do not know that Dr. Sharp has ever had cause to modify this opinion. At any rate, I quite agree with it.

It may be well to mention, in conclusion, Standinger's summary of the forms of this species, with their distribution:—

Quercus, Linn.—"Europe (exc. Graec. ?), As. Minor, Arm., Sib., Can?"

ab. (et var.) *callunae*, Palmer, *Zool.*, 1847, p. 1656.—"Scot., Succ., Germ.*—♀, obscurior, vix nom. conserv. = *quercus*, Linn., *Faun. Succ.*"

ab. (et var.) *spartii*, Hb. 173 ♂; *riburni*, Gn., *An. Soc. France*, 1868, p. 405.—"Obscurior, al. omnibus anguste flavo-fasciatis.—Germ. (south) (ab.), Gal. (south) et Ital. (north) (var.)."

* I may add that, in June, 1895, a fine ♀ *B. callunae* emerged from a cocoon spun by a larva found the previous August. The full-fed larva was found on Mont de la Saxe (Piedmont), about August 8th, feeding on *Hippophaes rhamnoides*, at an elevation of about 4,000 feet. This is important, as being outside the range given by Staudinger for *callunae*, and also as showing that *callunae* is the highland form in those districts where *spartii* is the lowland form.

- ab. *catalaunica*, Stdgr., p. 69 (1871).—"Obscurissima ♀ maris colore, al. ant. fascia angustissima flava. al. post. unicoloribus (fascia subnulla).—Catalonia."
 var. (et ab.) ♂, *roboris*, Schrank.—"♂, al. ant. fasciis latis flavis, al. post. margine late flavo.—Germ. (south) (ab.), It. (north) et Gal. (south-w.) (var.)."
 var. *sicula*, Stdgr., *Cat.* (1861), p. 30.—"Al. ant. fasciis angustis flavis, al. post. margine lato flavo.—Sic. ? And."

SCIENTIFIC NOTES AND OBSERVATIONS.

GENERIC TYPES IN *PLUSIA*.—The object of the present notice is to give the types of what seem distinct genera among the British species passing under the title *Plusia*. Reference should be made to a short summary given in the *Proc. Am. Philosophical Society*, Dec., 1895, 417. *PLUSIA*, Hübn., 1806.—Type: *P. chrysitis* (*chrysitis*, L.; *chryson*, Esp.; *bractea*, Fab.). *POLYCHRISIA*, Hübn., 1816.—Type: *P. moneta* (*moneta*, Fab.). *CHRYSPIDIA*, Hübn., 1816.—Type: *C. festucae* (*festucae*, L.). *AUTOGRAPHIA*, Hübn., 1816.—Type: *A. gamma* (*gamma*, L.; *iota*, L.; *pulchrina*, Haw. = *r-aureum*, Gn.; *interrogationis*, L.; *ni*, Hübn.). Of the other generic terms the type of *Agrapha* is *glauca*, Cram.; the N. Am. *acrea* is a *Plusia*. The yellow-winged species, *devergens* and *divergens*, belong to *Syngrapha*, Hübn., 1816—with the type *devergens*, Hb.—A. RADCLIFFE GROTE, M.A., Roemer Museum, Hildesheim.

TEPHROSIA BISTORTATA, VAR. GEN. II., CONSONARIA.—A CORRECTION.—This varietal name, referred to in my paper on "The Tephrosia Tangle" (*ante*, p. 81), should be cited to Steph., Wood, *nec* Haw. The error, though trivial, annoys me greatly, as I rather pride myself on my care in this kind of work. Through an unfortunate combination of circumstances, I was unable to get access to Haworth's Vol. II., at the moment, and I therefore trusted to Wood—who so often figures the very same specimens from which Haworth describes—for my determinations. These references to Haworth were the *only* ones which I did not personally verify, and the error shows the importance of obtaining *every one* at first hand. Haworth's *consonaria* was described after a single specimen captured in May, and is no doubt the true *consonaria* of Hübner (*tetragonaria*, Steph., Wood). His *crepuscularia* (p. 177), which would have priority if indubitably referring to the second brood of *T. bistortata*, is too uncertain to be substituted for the clearly defined *consonaria* of Wood. It (*crepuscularia*, Haw.) certainly *includes* this second brood, for the month indicated is July; but in all probability (from the description, and the citation of Hb., 158, as well as from Stephens' and Wood's interpretation) it *also* includes, or is even *chiefly* based upon, the single-brooded species. The *argumentum e silentio*, founded on the omission of any mention of May and June, as times of appearance, would be ridiculous. Many of Haworth's descriptions are made from cabinet specimens, and it is most improbable that he always obtained precise data; consequently he might have described from any number of cabinet specimens of the single-brooded species, and yet, having captured but one specimen of *T. bistortata* second brood in July, have indicated that as the month for his species; that is, if we assume

that—like our friends, Messrs. Barrett and Briggs—he took the July form to be specifically identical with those of May and June.—LOUIS B. PROUT, F.E.S., 246, Richmond Road, Dalston. Oct. 26th, 1896.

THE GENUS *NEURONIA*.—This genus is established by Hübner, *Verz.*, 215, for *popularis* and *perplexa*. The date of the *Verzeichniss* is 1816, but an earlier date than 1818–1822 cannot be assigned this portion of the work (see Scudder, *Historical Sketch*, 97). *Neuronia* is limited by Stephens to the type *popularis*. This restriction must be followed, and renders *Tholera*, Hübner, *Verz.*, 214, for *cespitis*, *furra*, *extrema*, again a mixed genus, a *quantité negligible*. The type of *Tholera* must, if *cespitis* be strictly congeneric with *popularis*, be sought in *furra* or *extrema*, after Stephens' use of *Neuronia* for the type *popularis*. Therefore, under Mr. McLachlan's statement that *Neuronia* is preoccupied, a new term of replacement must be proposed for the type *popularis*, and I hope Mr. Tutt will propose one, which will then enter into all the rights which *Neuronia* held at the time of its restriction to the type *popularis*. Ochsenheimer, iv., 70, 1816, refers *popularis* to *Hadena*, which is one of the largest of Ochsenheimer's mixtures, but includes the type of *Hadena*, viz., *cucubali*. Should *cespitis* be generically distinct from *popularis*, the term *Tholera*, since neglected, would be available for the species; but Stephens' action, and that of other authors, prevents a recurrence to this earlier term for the genus represented typically by *popularis*.—A. RADCLIFFE GROTE, M.A., Roemer Museum, Hildesheim.

VARIATION.

MELANIC INSECTS IN THE NEW FOREST IN 1896.—One very curious feature of the New Forest collecting has been the very marked tendency to melanism, shown in several species. Those in which I have noticed it more especially have been *Limenitis sibylla*, *Dryas paphia*, and *Cleora lichenaria*. The number of black, or nearly black, *L. sibylla* taken was extraordinary, amounting in all to not less than forty, I should think. I know also of about a dozen fine aberrations of *D. paphia*, most of which showed a decided increase of the black markings on the wings, while the tawny ground-colour remained. The *Cleora lichenaria*, in bred specimens, showed a decided tendency to darker colour than ordinarily, and I have two specimens of quite a melanic form. The characteristics of the weather from March to middle of August, were a great excess of sunshine and lack of moisture. I do not know whether these were the causes. It would be very interesting to know if, in dry, hot climates, these particular insects showed this tendency to melanism.—P. M. BRIGHT, F.E.S., Roccabruna, Bournemouth.

VARIATION OF *BOARMIA REPANDATA*.—I have been much struck with the tendency of *Boarmia repandata* to run to dark forms this year, and the ab. *conversaria* has been quite common. This is striking, as *B. repandata* itself has not been more plentiful than usual. The proportion of *conversaria* this season, as compared with the last, would be about ten to one.—E. C. STUDD, M.A., F.E.S., Oxtou.

PIERIS RAPÆ AB. NOVANGLIÆ.—I have been struck with the very yellow tint assumed by *Pieris rapae*. During the very hot summer I took them of quite a sulphur colour.—IBID.

ABERRATIONS OF *CLEORA GLABRARIA* AND *PLUSIA MONETA*.—I bred a very dark female *C. glabraria*, from a New Forest larva, and a rich chocolate-coloured *P. moneta*, in a second-brood batch, from Ascot.—E. A. BOWLES, M.A., F.E.S., Waltham Cross.

ABERRATION OF *BOMBYX CALLUNÆ*.—The best aberration that has come under my notice this season is a buff-coloured male *Bombyx callunæ*, almost as pale as an ordinary female specimen. It was reared from a larva found feeding on heather on Hazelhead Moor, near Aberdeen.—A. HORNE, Aberdeen.

ABERRATIONS OF *LIMENITIS SIBYLLA* AND *DRYAS PAPHIA*.—It has been a great season for aberrations among the Diurni in the New Forest. Many black *Limenitis sibylla* have been taken, one of which, an ab. *nigrata*, is in my cabinet. Several good aberrations of *Dryas paphia* have also been taken. I have one, a ♀, in which the black spots and dashes on the wings are so strongly confluent, as to form an almost continuous dark band.—J. C. MOBERLY, M.A., F.E.S., 9, Rockstone Place, Southampton.

HERMAPHRODITE *FIDONIA PINIARIA*.—I found *Fidonia piniaria* very abundant this year, and I got one hermaphrodite specimen.—F. NORGATE, Bury St. Edmunds.

NOTES ON LIFE-HISTORIES, LARVÆ, &c.

THE EGG-LAYING AND COCOONS OF *PAMPHILA COMMA*, WITH SOME REMARKS ON ITS ABUNDANCE.—On August 1st and 3rd I was with a friend on the downs, near here, and was surprised at the abundance of *P. comma*. They were all over the downs, and it was no uncommon sight to see a dozen or more males chasing a female. I had as many as five in the net at one time, and many times three and four. I was fortunate enough to see a female depositing ova, which it did singly on blades of grass. I subsequently obtained a good number of ova from females, which I put in a glass jar with grass and a few pieces of lucerne. Finding several of the insects drying their wings, I looked for the empty pupa-cases, and succeeded in finding three or four, which were spun up among the short herbage near the ground, but not actually on the ground, enclosed in a very slight silken cocoon.—A. H. HAMM, Reading.

ACIDALIA DILUTARIA (HOLOSERICATA), PARTIALLY DOUBLE-BROODED, WITH SOME ACCOUNT OF THE LARVA.—On June 25th last I took, in the usual Bristol locality, about twenty specimens of *A. dilutaria* (*holosericata*), very much worn, although in previous seasons I have found them just coming out on that date, and in perfect condition. I kept all the females for eggs, as they were not worth setting. They commenced laying at once, and altogether I obtained over three hundred eggs. I was staying in the West of England for three weeks, and experienced exceptionally hot weather while there, and this may account for the larvæ beginning to emerge in nine or ten days' time. In ordinary seasons I have found them take from a fortnight to three weeks. I fed the larvæ on knotgrass, and they grew quickly at first, but after three or four weeks seemed to feed but slowly. I then gave my friend, Mr. W. A. Southey, about thirty larvæ, which he fed up indoors, and kept them much warmer than mine were kept. They got on rapidly, and began to pupate the first week in September, and

the first imago emerged about September 26th. The imagines seem to emerge at all times, day and night. The larvæ spin a loose cocoon on the surface of the earth, or if there is no earth or sand in the pot, they spin a few leaves of the food-plant together, or any rubbish they can find. They seem to like the bloom and seeds of the knotgrass, and prefer it slightly withered. They are very sluggish in their habits. A few of my larvæ fed up, but the majority have settled themselves for their winter sleep, and I fear I shall lose them, as the knotgrass is so late in making its appearance in the spring. A large proportion of those bred are females.—W. G. PEARCE, 94, St. James' Road, Holloway, N. Oct. 14th, 1896.

THIRD BROODS BRED IN 1896.—Dr. Riding (*ante*, p. 189) has recorded one instance of a partial third brood this season (*Tephrosia bistortata*). I add two others from my own experience. *Spilosoma fuliginosa*, ♀, captured at Sandown, July 30th; 29 eggs laid. One larva escaped from the breeding cage, 5 have laid up for hybernation in the orthodox way, 23 pupated in the latter half of September. From these the first two moths have emerged (indoors) this morning, October 26th (cfr. Barrett's *Lepidoptera*, ii., p. 275). *Acidalia subsericeata*.—This species, in forward seasons, is double-brooded, at Sandown, in a state of nature (*vide*, *Ent. Rec.*, iv., p. 278; viii., p. 192). I observed a pretty full second brood in 1889, 1893 and 1896, and an odd specimen on August 28th, 1895. A female, captured this year, on July 31st, laid a few eggs (about 17). All but two (which are now hybernating) fed up rapidly, pupating about September 20th, and the imagines commenced emerging (indoors) on October 16th.—LOUIS B. PROUT, F.E.S., 246, Richmond Road, Dalston. Oct. 26th, 1896.

FORCING *PLUSIA BRACTEA*.—I captured one female *Plusia bractea*, on July 11th, which laid eggs on the night of July 12th. These eggs hatched July 19th; another female *P. bractea* was captured July 20th; she laid a few eggs on July 21st, which hatched July 28th. These larvæ were kept in a cold frame, fed on lettuce (var. "All-the-year-round") and groundsel (*Senecio vulgaris*) until August 31st, when they were put into a cucumber-house, where the temperature varied between 68° and 80° Fahr. As lettuce and groundsel are both very succulent, they soon rotted in the high temperature, and the excrement from the larvæ appeared to be too soft, so I introduced dandelion (a French var. grown in gardens for salads), which the larvæ preferred to either lettuce or groundsel in the high temperature, and fed up splendidly on it. The first larva spun up on September 13th, and several more on September 19th, and continued to do so up to the end of the month. The first insect emerged on September 24th, and the last of 26 insects on October 15th. It appears that *P. bractea* only remains about fourteen or fifteen days in the chrysalis state in the above high temperature.—JOHN FINLAY, Morpeth.

DOUBLE-BROODEDNESS OF *PLUSIA FESTUCÆ*.—In answer to the letter from Mr. H. Shortridge Clarke (*ante*, p. 215), *re Plusia festucae*, I can say that here it is always double-brooded. About four years since I had several pupæ in September, which emerged and laid their ova in the box they were in, and in about ten days they hatched, and I kept them some time, but did not succeed in hybernating them; and I fancy they do not get through the winter well, as we only find a few perfect insects in June, but in August, every year, we find the larvæ and pupæ

in plenty. This brood flies at the end of August or beginning of September, according to the season.—W. J. CROSS, Ely. *October, 1896.*

In answer to Mr. H. S. Clarke's query, I saw a fine caught specimen of the above species, at Wicken, on June 7th last. I also took a number of larvæ, in North Wales, during the last weeks of July, feeding on *Iris pseud-acorus*, from which imagines emerged, between August 6th and September 9th. I have a note that I took *P. festucae* in fine condition, at Wicken, on June 25th, 1889. Is it the Editor's experience that the light form is confined to the Fen district?—E. B. NEVINSON, F.E.S., 3, Tedworth Square, Chelsea, S.W. [Our experience with this insect in a state of nature is somewhat limited. Will those with more experience please reply?—ED.]

While away from home, a specimen of *Plusia festucae* emerged in my breeding cage about September 10th, from a pupa which had been found by a boy working in my garden.—W. B. THORNHILL, Castle Cossey, Castle Bellingham, Ireland. *October 25th, 1896.*

NOTES ON THE OVUM AND LIFE-HISTORY OF PHIBALAPTERYX VITTATA.—I found that *Phibalapteryx vittata* (*lignata*) was well out on June 3rd, and from two females I obtained a nice lot of ova. One I sleeved upon a growing plant of *Galium verum*, and she laid her eggs on the extreme edge of the small leaves. The eggs were of a dull primrose colour, and appeared very conspicuous. All the ova obtained hatched out within ten days, and the larvæ rapidly fed up amongst the dead food and the loose soil. The first moth was out on July 31st, the remainder emerging the following fortnight. I noticed them drying their wings between eight and nine in the morning.—S. WALKER, Eddercliffe, Queen Anne's Road, York.

NOTES ON THE EARLY STAGES OF ENODIA HYPERANTHUS.—The ova were received from Mr. J. W. Tutt, July 15th, 1896. *Egg*.—The egg is larger than that of *Epinephele ianira*, and is of a very different shape. It forms an irregular rounded dome, about same height as diameter of base; base depressed, semi-transparent, no ribbing, except faint traces near shoulder. The top has a honeycomb appearance. The surface smooth and shiny, but irregular. The larva eats a slit round the shoulder. *Young larva*.—None of the eggs hatched, but one larva had already emerged when they came to hand; this was placed with young larvæ of *Epinephele ianira*, and I did not again come across it until July 23rd, when I made the following note: Very similar in appearance to the larva of *E. ianira*. *Head*.—Brown, with very rough surface, and rounded in shape. *Body*.—Thickest in middle, tapers slightly towards head and anus; faint traces of an anal plate; colour, pale brownish-green; a broad green medio-dorsal band, and narrow sub-dorsal lines. The lateral area greener, with pale whitish spiracular band. The anterior trapezoidals much larger than posterior ones, also hairs arising from them. Hairs black, long, stiff and thorny, curved as in *E. ianira*.

August 7th, 1896, (?) *2nd or 3rd skin*.—Length, about $\frac{3}{16}$ of an inch. *Head*.—Rather larger than pro-thorax, rather inclined to be tall, and slightly notched on crown; pale brown, mottled with darker; pitted all over, the bottom of pits being dark brown. Hairs on head are still long, stiff and thorny; they are not, however, so remarkable for their large size as in earlier stages. *Body*.—Scutellum indistinct. A broad, very dark clear green medio-dorsal band; dorsal area,

whitish, with a faint greenish tint; narrow clear green sub-dorsal lines; lateral area, green, with a broad whitish spiracular band. Ventral area, whitish. The skin is very rough, has a granular appearance. Division of segments, indistinct. Thoracic segments, very large. Tubercles, cone-shaped, not chitinous; hairs long, stout and thorny. A few small secondary hairs, each arising from small tubercles, similar to those previously mentioned, are present in this skin, but no trace of spicules. On anal segment there are two large cone-shaped processes, very like large tubercles, bearing long hairs; they point backwards, and project beyond the anus, giving the larva its forked appearance at the posterior extremity. In this stage I noticed that the spiracles were mounted on short dark-coloured stalks or tubes, in appearance something like the partially developed feathers one finds on young birds. The disparity in size between those on the prothorax and on the 8th abdominal segment, compared with those on the abdominal segments 1 to 7, is very striking. Probably the spiracles are stalked in 1st skin, although I did not notice them; at any rate, this is the case with the larva of *E. ianira* in 1st stage.

September 23rd, (?) 4th Skin.—About $\frac{3}{8}$ of an inch long. Short, stumpy, and slug-shaped, tapering considerably towards head and anus. The head is taller and wider than prothorax; it gives the larva the appearance of having a neck. *Head*.—Tending towards trapezoidal shape, notched at crown, colour as before, only dark mottlings are formed into long ovals, one on either lobe of face; still thickly covered with hairs. *Body*.—Of a pale wainscot-brown colour, with dark medio-dorsal stripe, traces only of subdorsal stripes, and a broad whitish lateral flange. Segments, fairly distinct; the thoracic segments divided into 4 sub-segments. The abdominal segments appear to have 3 sub-segments (1 very large and 2 small), the large one, however, has a faint partial sub-division. The hairs and tubercles are in structure and appearance as previously, but small secondaries are, I think, more numerous. Spiracles are still mounted on stalks, but are smaller in proportion to the size of the larva.—A. BACOT. Oct. 1st, 1896.

NOTES ON COLLECTING, Etc.

NOTES FROM READING.—I have already given a note as to the early spring collecting in this district (*ante*, p. 217). On Easter Monday I had the pleasure of taking, for the first time, that fine species, *Endromis versicolor*, capturing one ♂ on the wing, and finding a ♀ hanging to the birch twigs, as is usual, two others being taken the same day by friends. I also found two small batches of ova, one of 11 and another of 15, laid on the small twigs of the birch. *Stauropus fagi* has also turned up in some numbers, the first being taken as early as April 26th, the earliest date of which we have any record here, and it continued well into June. *Acontia luctuosa*, which I have already recorded as being more than usually abundant, was well out by the middle of May, and I have already recorded my want of success with *Sesia sphegiformis*. I find the best way to obtain this species is to get on the ground early, say between 7 and 8 a.m., and search the alder stems carefully, when you will find the pupæ protruding ready for emergence, or the insect actually emerged; care should be taken to keep a virgin ♀ for assembling. On several occasions I have found

pupæ protruding themselves in the evening, when I carefully fit over them a glass-bottomed box, and leave. Such I have generally found in the morning emerged and safe. On one occasion it was not so, for on visiting it in the morning I found it still protruding. Thinking it would emerge later, I left it for some hours, to work a more distant part of the wood, but on returning in the afternoon it was as I had left it, evidently intending to emerge next day; as I should not be there again for a week, I did not want to leave it, so I carefully got it out, no easy task to do without injuring it, as it was so soft. I laid it on the palm of my hand and gently cracked the pupa, when the moth immediately freed itself from its pupa shell, and, running to the tip of my finger, settled itself to dry and expand its wings, which operations were completed in about 15 minutes. I find the virgin females do not call until nearly mid-day, and those that I have taken *in cop.* have always been thus taken in the afternoon, sometimes as late as 5 p.m. *Sesia formiciformis* was again exceedingly scarce. I had never taken *Sesia cynipiformis* until this season, when I was fortunate to find it in oak stumps. The larva feeds between the bark and solid wood, and may be easily found by the frass which it throws out. I should say it takes two years to feed, for in stumps where the trees had been felled last year, only half-fed larvæ could be found, but in older stumps both full-fed larvæ and pupæ were obtained. *Leucophasia sinapis* was as plentiful as ever during May and part of June, the second brood, var. *diniensis*, being fairly out by July 10th, but was by no means so plentiful as in 1893. The spun-up leaves of the broad-leaved sawfly yielded a few larvæ of *Tethea retusa* and *Clooceria riminalis*, one of the latter, which I bred, being the rare type with the basal half of the fore-wings very dark. By beating blackthorn for several hours, I obtained about a dozen larvæ of *Zephyrus betulae*. Sugar has been generally unproductive and most uncertain. Some nights it paid very well, and yet the next night the same round would be almost a blank, although as regards temperature, wind, etc., identically the same conditions prevailed. The most notable species at sugar has been *Dicycla oo*, a species of which only two had previously been taken here. On one or two nights it was fairly plentiful. Unfortunately for me, I did not go on those nights, but several of my friends did well. The ab. *renago* was also taken. During July it was almost a blank, but towards the end it paid better, when *Noctua rhomboidea* came on fairly well, and did so until the middle of August, when it dropped off suddenly. During the first week in August one *Noctua dahlii* and two *Triphacua subsequa* (= *orbona*) were taken, both being new to the district. The Xanthids were so late that it appeared at one time that they would be a complete failure, although a few *Mellinia gilvago* and *Cirrhoedia verampelina* were taken at the lamps in the town, but in October the Xanthids made an appearance, and *Tiliacea* (*Xanthia*) *aurago* was not uncommon.—A. H. HAMM, Reading.

CATOCALA FRAXINI IN THE ORKNEY ISLANDS.—I saw a very fair example of *Catocala fraxini* last week, in Orkney, taken by Mr. Jas. L. Shaw, at the end of August, resting at the roadside between Kirkwall and Finstown. Unfortunately the thorax is quite bald, but the wings are in fairly good condition, considering the usage it must have got. This is the fourth specimen that I know to have been taken in the north of Scotland during the past twelve or fifteen years. I wonder if they breed here?—ARTHUR HORNE, Aberdeen.

CATOCALA FRAXINI AND EUVANESSA ANTIOPA AT ABERDEEN.—I heard from a member of the Aberdeen Working Men's Natural History Society, that the above were recorded at one of their meetings as being taken at Aberdeen. On making enquiry, I found that the specimen of *C. fraxini* was taken on September 14th, by one of the railway servants, resting on a wagon at the railway station. It was taken to Mr. George Sine, naturalist, King Street, and kindly presented by him to me. Apart from the tip of the left fore-wing being slightly damaged, it is otherwise in good condition. The *F. antiopa* was likewise captured on September 14th, flying at bramble blossom in Rubislaw Quarry. It was taken by a boy to Mr. J. Johnston, who is employed there, and does a little collecting. I have to thank Mr. Johnston for kindly adding it to my collection. It is in pretty good condition and well set.—ARTHUR HORNE, 52, Irvine Place, Aberdeen, N.B.

BUTTERFLIES IN NORFOLK.—This district is not particularly rich in Rhopalocera, but *Gonopteryx rhamni* seem to have been more than usually abundant here—the larvæ upon *Rhamnus frangula* being full-fed about the end of June, at which time my search for them nearly proved a failure, only one being found in a district, in which, judging from appearances, they must have been common a few days earlier. *Vanessa io* again appeared in numbers, where, last year, it was scarcely to be seen. *Pyrameis atalanta* has also been plentiful, freshly-emerged specimens being observed on July 20th. On the contrary, *Aglaia urticae* has been comparatively scarce. Last year it was in evidence everywhere. Larvæ of *Notodonta ziczac*, found nearly full-grown on July 19th, produced imagines on August 16th and 18th.—E. A. ATMORE, F.E.S., King's Lynn, Norfolk.

CAPTURES DURING JULY AND AUGUST NEAR CHELTENHAM.—Sugar paid pretty well during July and the beginning of August. I took *Noctua depuncta*, *Hadena abjecta*, *H. dissimilis* (suasa), *Calymnia affinis*, *C. diffinis*, *Agrotis obscura* (ravida), *A. simulans* (pyrophila), *A. ab. aquilina*, *Cossus ligniperda*, etc. During the day-time I captured *Thecla w-album*, *Zephyrus quercus*, *Polygonia c-album*, *Cyaniris argiolus*, *Polyommatus bellargus* and *P. agestis*.—(Major) R. B. ROBERTSON, Wellington Court, Cheltenham.

TETHEA RETUSA IN WALES.—I bred three specimens of *T. retusa* from three larvæ picked off a sallow in Carmarthenshire.—IBID.

CIRRHEEDIA XERAMPELINA IN GLOUCESTERSHIRE.—I captured, in the beginning of September, four specimens of this species at rest.—IBID.

REARING POLIA XANTHOMISTA VAR. NIGROCINCTA.—My experience with the "much-advertised eggs" of *P. var. nigrocincta* is precisely the same as that of Mr. Christy (*ante*, p. 241), except that, out of fourteen ova sent (for fifty-six perfect imagines) only five hatched. The remainder are at the disposal of anyone who wishes for them.—H. TUNALEY, F.E.S., 30, Fairmont Road, Brixton Hill, S.W.

SCOLYTUS IN WARWICKSHIRE.—A storm which passed over a part of Warwickshire, in the early part of 1895, uprooted a very large number of elm trees. The market was overstocked, and the timber was almost unsaleable at the time; consequently, an enormous quantity of trees remained where they fell, and still lay there when, in August last, I visited the neighbourhood of Kenilworth. One result of this has been, that *Scolytus destructor* has had a high old time. I examined some scores of trunks, and found the bark in every case riddled with

the original parent borings, and filled with countless myriads of larvæ. The holes made by the parent beetle are almost always situated in the crevices of the bark, and the larvæ are usually found in the bark, though also on the wood. In many cases I found the whole interior of the bark, for a space of several square feet, reduced to powder. On August 14th I took the first perfect insects, just emerged. They were all of small size, from $1\frac{3}{4}$ to 2 lines. The dead parent beetles, found in the same tree, varied from $2\frac{1}{4}$ to 3". There are two broods, one emerging in May—June, the other in August—September, the former being larger. I have noticed this difference in many other species. There can be no doubt that, when plentiful, this insect does attack perfectly sound and healthy trees. I fear, therefore, that the Warwickshire elms have a bad time coming. This destructive beetle is well known in London, having destroyed many fine elms in Kensington Gardens; and, in 1825, a fine avenue of elms in Camberwell Grove was ruined by them. It has also done great damage in France, Germany and Belgium. It is, therefore, to be hoped that measures will be taken to stay its ravages, by at once destroying the bark of the infected timber.—E. A. ELLIOTT, 41, Holland Park, W.

FURTHER NOTE ON *BOLETOBIA FULIGINARIA* AT HULL.—I have been to see the captor of the specimen of *Boletobia fuliginaria*, recorded *ante*, p. 245. It is a Mr. Keeble, 3, Victor Street, Holderness Road, Hull. He is not a collector, but he boxes insects for his brother-in-law, Mr. Russell, when he sees any. He was working all night in the ship-yard (either on the 21st or 28th of August), when the moth came to the light (about 12.20 midnight). He put it in a match-box, laid it on one side, and it was forgotten for some days. When he remembered it again it was dead and stiff. This accounts for its being loose on the pin (*ante*, p. 246). I think it was bred in the neighbourhood, for there is an abundance of fungi on rotten wood, in the timber yards, timber ponds and docks, near which it was found.—J. W. BOULT, 9, Finsbury Grove, Fountain Road, Hull. October 18th, 1896.

COLLECTING NEAR BURY (SUFFOLK) IN 1896.—On the Warrens in the Bury neighbourhood, larvæ of *Dianthoeia irregularis*, *D. carpophaga* and *Chariclea umbra* (*marginata*) were unusually abundant this season. *Heliothis dipsaceus* was also fairly abundant in the larval stage, chiefly on *Lychnis vespertina*. Both broods of *Acidalia rubricata* were on the wing in fair numbers on the Warrens this season. *Choerocampa porcellus* was fairly abundant in my garden at the blossom of *Centranthus* (red valerian). *Hecatera serva* larvæ were also abundant on the blossom of *Crepis virens*, whilst *Eupithecia linariata* and *E. coronata* (?) larvæ have been locally common on certain patches of *Linaria* and *Eupatorium* respectively. Sugar has been a failure with me this season, until the end of August, since when *Mellinia gilvago*, *Polia flavicincta*, *Anchocelis pistacina* and *A. litura* have been fairly numerous, *Noctua c-nigrum* and *Agrotis segetum* a few, with only one each of *Scopelosoma satellitia* and *Calymnia diffinis*, and two or three each of *Hypera rostralis* and *Brotolomia meticulosa*. The larvæ of *Cucullia verbasci* were in fair numbers, and those of *Eriogaster lanestris* were abundant in Norfolk, on the roadsides between Dereham and Foulsham, whilst *Plusia chryson*

(*orichalcea*) larvæ were very scarce at Chippenham. *Lithostege griseata* was rather scarce, whilst *Anticlea berberata* and *Scotosia certata* were in fair abundance, both in the larval and imaginal states. Larvæ of *Fidonia limbaria* (*conspicuata*) were very scarce. I fancy this species has been all but exterminated, as also its food-plant. The broom is mostly very young and small, and difficult to work, and the few older bushes do not appear to be in a fit condition to afford sufficient nutriment for the larvæ.—F. NORGATE, Bury St. Edmunds.

ANTICLEA SINUATA IN SUFFOLK.—I took eleven larvæ of *A. sinuata* from two adjacent plants of *Galium verum*, but all succumbed to parasites (two species), and careful search of acres of *Galium* in the same and adjacent warrens failed to produce another larva; but on searching a large extent of the same plant, about sixteen miles off, two more larvæ were obtained from the same plant, both of which pupated.—IBID.

COLEOPTERA IN SUFFOLK.—The beautiful blue and red beetle, *Chrysomela distinguenda* has been numerous on *Linaria* (yellow toadflax). I took one *Ocypus cyaneus* here, and a friend sent me six *Rhipiphorus* (*Metaceus*) *paradoxus* from one wasp's nest near Bury.—IBID.

TENBY IN JUNE.—I spent the first fortnight of June at Tenby, and found sugar very productive, *Agrotis ripae*, *Mamestra albicollis* and *Leucania littoralis* turning up in numbers.—(Rev.) E. C. DOBRÉ FOX, M.A., Castle Moreton, Tewkesbury.

FOOD-PLANT FOR TÆNIOCAMPA MINIOSA.—Have any lepidopterists tried the large oak-galls for feeding *T. miniosa* larvæ? I brought a great number back from the New Forest, and they grew to a large size when fed upon this food, which they preferred to fresh oak-leaves. The large rough galls were very plentiful this year, and as the larvæ seemed to like them so much, it was an easy way of satisfying their voracious appetites, the galls keeping juicy longer than leaves.—D. L. BROUGHTON, Doddington, Nantwich.

LATE APPEARANCES.—Although insects were unusually early this year, I was surprised to find they remained flying long after their usual time. For instance, when I was sugaring at Ramnor, in the New Forest (not Rammore, as printed *ante*, p. 217), on September 10th, I took a specimen of *Cutocala sponsa*, and on September 29th, a specimen of *Boarmia consortaria*. Of course both were in poor condition. I found both larvæ and imagines scarce in the Forest, on account of the wet, but as soon as the ivy was in flower many insects put in an appearance, viz., *Xylina socia*, *Scopelosoma satellitia*, *Dichonia aprilina*, *Xylina rhizolitia*, *Orrhodia vaccinii*, *O. ligula* (*spadicea*), *Mellinia circellaris*, *Miselia oxyacanthæ*, *Anchocelis pistacina*, *Hadena protea*, *Anchocelis macilentia*, *A. rufina*, *Citria fulvago*, *Cidaria psittacata*, etc. Several larvæ of *Demas coryli*, *Drepana unguicula*, two of *Heterogenea limacodes*, and also three of *Cerura furecula*, occurred in October. These last must have been very late, as I had two which pupated in August.—W. J. CROSS, Ely. October 20th, 1896.

SECOND BROODS OF LEPIDOPTERA.—A specimen of *Leiocampa dictacoides* came to light on August 10th. *Ligdia adustata*, ova sent me from Chichester, and sleeved out in the open, produced a second brood at the end of August.—(Rev.) C. D. ASH, M.A., Skipwith Vicarage, Selby, Yorks.

SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.—November 4th, 1896.—CAST NYMPH-SKINS OF DRAGON-FLIES.—Mr McLachlan exhibited a collection of the cast nymph-skins of more than one-third of the species of European Dragon-flies from the Département de l'Indre, France, sent to him by Mons. René Martin. Two or three of the species had been reared in an aquarium, but the identification of most of them has been secured by finding the imago drying its wings in the immediate vicinity of the cast skin. ABERRATIONS OF *ACIDALIA MARGINEPUNCTATA*.—Mr. R. Adkin exhibited a long series of *Acidalia marginepunctata*, taken on the sea-coast at Eastbourne, Sussex, during the past eight summers. The series included examples of a bone-coloured form with slightly indicated transverse markings; others much dusted with black scales, giving them a deep grey tone, with well-developed markings; and sundry forms intermediate between the two; also three taken this year, in which the whole of the wings, with the exception of a pale submarginal line, is densely covered with scales, giving them a similar appearance to the so-called "black" forms that are found among some of the species of *Boarmia* and *Tephrosia*. ABERRATION IN THE ELYTRA OF A FEMALE *DYTISCUS CIRCUMCINCTUS*.—Mr. Horace St. John Donisthorpe exhibited a female specimen of *Dytiscus circumcinctus*, Ahr., with elytra resembling in form those of the male. He said the specimen had been taken in Wicken Fen in August last. *MELLINIA OCELLARIS* AT SOUTHEND.—Mr. Tutt exhibited a specimen of *Mellinia ocellaris*, recently taken near Southend, together with a specimen of *M. gilrayi* for comparison. *ARGYRESTHIA ATMORIELLA*.—He also exhibited four specimens of *Argyresthia atmoriella*, taken by Mr. Atmore, last June, at Lynn, Norfolk. PUPA-CASE OF *THYMELICUS LINEOLA*.—He also exhibited a pupa-case of *Thymelicus lineola*, from the Essex salt marshes. He drew attention to the structural characters exhibited by it, and pointed out that it differed markedly from the pupa of *Pamphila comma*, exhibited at the last meeting. These structural differences led him to suggest that the separation of the old genus *Hesperia* (as still maintained by some British lepidopterists) into *Pamphila* and *Thymelicus*, should be insisted upon. *MELAMPIAS PHARTE* AND *M. MELAMPUS*.—Mr. Tutt also exhibited a long series of a *Melampias* which he had captured at Le Lautaret, in the Dauphiné Alps, at an elevation of 7,000–8,000 feet. He observed that the specimens exhibited were peculiar in some very important particulars, combining some of the characteristics of *Erebia* (*Melampias*) *melampus*, and *M. pharte*. He said his attention had been first drawn to this form by some fine examples, captured by Dr. Chapman and himself on Mont de la Saxe in 1895. Compared with the Tyrolean examples of *M. melampus*, this form showed a tendency to a lengthening of the fore-wings and to an obsolescence of the black dots, thus approaching *M. pharte*; but the females presented none of the typical characters of the female of *M. pharte*. On the whole, he felt satisfied that the Mont de la Saxe specimens were a form of *M. melampus*. Mr. Elwes observed that, though all the Continental butterflies had been so long studied by European entomologists, he did not think the form exhibited by Mr. Tutt had been hitherto noticed. He considered that Mr. Tutt had made out his case, and he agreed in the conclusion at which he had arrived. Mr. McLachlan,

Herr Jacoby, and Professor Meldola continued the discussion. **ABER-
RATION OF ACIDALIA MARGINEPUNCTATA.**—Mr. E. Ernest Green exhibited
a typical specimen of *Ephyra omicronaria*, together with what he
believed to be a remarkable melanic variety of the same species, taken
by Dr. Dudley Wright, at Pegwell Bay, near Ramsgate, in September
last. Some of the Fellows present, after an examination of the
specimen, expressed an opinion that it was a variety of *Acidalia*
marginepunctata, and not of *Ephyra omicronaria*.—November 18th,
1896.—**TEPHROSIA BISTORTATA AND T. CREPUSCULARIA, ETC.**—Mr. Tutt
exhibited a series of the ochreous form of *Tephrosia bistortata*, Goetze,
known as ab. *abietaria*, Haw., captured by Mr. Mason in March, 1895
and 1896, near Clevedon, Somerset; also a series of the second brood
of the same species (ab. *consonaria*, St.), bred from ova laid by the
Clevedon specimens. He also exhibited a series of *Tephrosia cre-
puscularia*, Hb. (*biundularia*, Esp.), taken by Dr. H. H. Corbett, at
Doncaster; a peculiar variety of *Hipparchia semele*, captured by Mr.
H. S. Clarke, near Ramsey, Isle of Man; also a series of *Plusia*
bractea, bred by Mr. J. Finlay, of Morpeth, from ova laid in July last.
The eggs and larvæ had been subjected to forcing treatment, with the
result that the mothsemerged in October. Mr. Tutt also exhibited a very
dark specimen of *Polia chi* ab. *olivacea*, captured at Meldon Park,
Morpeth, by Mr. Finlay. **DEVELOPMENT OF WINGS IN THE COCCIDÆ.**—Dr.
Sharp called attention to Mr. Ernest Green's plates of the *Coccidæ*, of
Ceylon, which were exhibited on a screen in the room, and said that
he was inclined to consider the *Coccidæ* as a distinct order of insects,
but at present the evidence was hardly sufficient to warrant this. He
asked Mr. Green if he could give him any information with regard to
the development of the wings in the male. Mr. Green said that in
the males of the *Coccidæ* the wings first appeared in the penultimate
stage as small projections on the sides of the thorax. These wing-
pads grew to a certain extent without any further ecdysis. Though
the insect was then quite inactive, and took no food during this stage,
the rudimentary wings and legs were free from the body, and were
capable of some slight movement. After the final ecdysis the wings
of the imago were fully expanded, and assumed their natural position
before the insect left the sac, or puparium, in which the resting stage
had been passed. Mr. McLachlan and others continued the dis-
cussion. **INSECT-CATCHING SPIDERS.**—Mr. Bethune-Baker exhibited a
yellow spider from Orotava, which was of the exact colour of the
flowers that it usually rested upon, and which had been observed to
catch *Vanessids* which settled on these flowers. Mr. Barrett said he
had noticed a spider with the same habit on the Ox-eye Daisy in
Surrey. Mr. Bethune-Baker also exhibited a very curious dark
variety of *Arctia caja*, bred by Mr. Moore. **INJURY TO BRISTLES BY**
TINEA BISELLIELLA.—Professor Meldola stated that it had been of late
found difficult to store bristles in the City, owing to the ravages of a
moth, of which he exhibited living specimens of the larvæ and pupæ.
Mr. Barrett said that the moth was *Tinea biselliella*. Mr. Blandford
stated that the bisulphide of carbon treatment might be found to be
of advantage if it were practicable, but more would have to be
ascertained with regard to the extent and character of the ravages
before anything could be determined upon. Mr. Merrifield, Mr. Green,
and others took part in the discussion which followed. **FORMALIN AS A**
PREVENTIVE OF MOULD.—Mr. Blandford called attention to the use of

formalin as a preventive of mould, and said that it would probably be found of use in insect collections; an object once sprayed with this substance never became mouldy afterwards. Professor Meldola said that formalin was another name for a solution of formic aldehyde: it is now much used in the colour industry, and is, therefore, produced on a large scale.

THE CITY OF LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—November 3rd, 1896.—INSECTS FROM WISBECH.—Mr. Oldham exhibited *Plusia iota*, *P. chrysitis* (larger and darker than usual), and *Euchloë cardamines*, with the central spot very small, all from Wisbech. ABERRATIONS.—Mr. H. H. May exhibited *Boarmia repandata*, ab. *conversaria* (3 ♂ and 3 ♀), taken at Lyndhurst, June, 1896. Also a male *Himera pennaria*, having the wings suffused with smoky brown, and the apical white spot rather larger than usual; and a ♂ *Agrotis exclamatoris* with confluent stigmata. EGG OF PAMPHILA COMMA.—Mr. Bacot said he had opened an egg of *Pamphila comma* on October 11th last, and had found the young larva fully developed within. PUPÆ OF PAPILIO MACHAON.—He also read the following notes on pupæ of *Papilio machaon*:—"During the past season I had some larvæ of *Papilio machaon*. They were fed up on carrot-tops, in a hat-box, with a small muslin-covered opening in the lid to admit light and air. Three or four fastened themselves upon carrot stems, and produced green pupæ. Three attached themselves to a red terracotta flour-pan (exhibited), and turned to grey pupæ, strongly shaded with dark brown. The remainder (seven) pupated on the white sides and top of the box, and were in every case of the grey form, though varying greatly as to the extent and depth of the brown shading, one being dirty white rather than grey, with hardly a trace of darker shading on it." MELLINIA OCELLARIS IN ESSEX.—Mr. Tutt exhibited a specimen of *M. ocellaris*, and read the following notes:—"The specimen exhibited was captured by Mr. F. Whittle, in September, 1894, who writes:—'I send for your inspection a fine specimen of *M. gilrigo*. I suppose it is *gilrigo*, not *ocellaris*, although its superior wings are sharply falcate, and there is a conspicuous white spot at the base of the reniform. *M. gilrigo* was not uncommon at the time.' There is no doubt that it is *M. ocellaris*. The fact that the British individuals of *Mellinia ocellaris* are almost always taken where *M. gilrigo* occurs, leads me to refer to a quotation from *The Brit. Noctuae and their Varieties*, vol. iv., p. 122. This relates to a statement by Fuchs, who says:—'My own captured *gilrigo* and *ocellaris*, however, lead me to believe in the identity of these species, as I have one *gilrigo* with the tips of the fore-wings acutely pointed as in *ocellaris*. All my specimens, both of *gilrigo* and *ocellaris*, have been taken in the noted poplar avenue of Hamburg, where *gilrigo* is the rarer, and *ocellaris* the commoner species. The freshly-emerged specimens were taken on the trunks of poplars during the afternoon' (*Stett. Ent. Zeit.*, vol. xlv., p. 264)." Mr. Tutt said that, in his opinion, the species were abundantly distinct, and he exhibited a typical specimen of *Mellinia gilrigo* for comparison. ISLE OF MAN INSECTS.—Mr. Tutt exhibited, for Mr. H. Shortridge Clarke, a box of insects from the Isle of Man, comprising, among others, *Hipparchia semele*, a male specimen of the ab. *addenda*, *Zygæna trifolii*, *Agrotis corticea*, *A. vestigialis*, *A. tritici*, *Pseudoterpna pruinata*, *Helotropa leucostigma*, *Epunda lutulenta*

ab. *sedi*, *Hadena contigua*, *Caradrina taraxaci*, *Anchocelis rufiga*, *Porthesia similis*, etc.; also an aberration of *Abraaxas grossulariata*, with very strong black and orange markings, and a female aberration of *Amphidasys betularia*, in which the usual black peppering was absent, the whitish ground colour, with only the traces of the ordinary transverse lines, giving the specimen a strange appearance. The type occurs in the Isle of Man. BOMBYX QUERCUS AND BOMBYX CALLUNÆ.—Capt. Thompson re-opened the discussion on these insects, and said that he had, since he read his paper in May last, looked up the *Zoologist*, 1847, for Palmer's description of *B. callunæ*, but found that, although there was a very complete description of the early stages, there was no mention of the imago. The antennæ, however, were somewhat fully dealt with. Mr. J. C. Warburg stated that the data given by Palmer did not prove to be correct when a number of specimens were carefully examined. Mr. Warburg exhibited a very long series of *Bombyx quercus* and *Bombyx spartii*, from Cannes. He stated that he had separated the larvæ by certain markings mentioned by Millière, Constant and Guenée, as being characteristic, but that certain larvæ might be classed with either group, and, as a result, he failed to find any clear distinction between the imagines bred from the larvæ thus selected. Mr. W. Hewett, of York, sent a very interesting series of specimens, consisting of—(1) nine female *callunæ*, all bred specimens, selected from a great number of females, and including a very striking pale aberration, another without the whitish band on the hind-wings, also a male with the bands suffused with olive colour; (2) eight male *callunæ*, bred, and two male *quercus*, one from Beverley, Yorks, and the other from York; also a half-grown larva of *callunæ*, and two cocoons of *callunæ*. Mr. Hewett notes:—"I do not possess any cocoons of *B. quercus*, but those that I have seen have been lighter than those of *B. callunæ*. Mr. Nicholson exhibited a series of 1 ♂ and 6 ♀, undoubted *quercus*, bred from a female, taken, newly emerged, on a gate-post on top of the cliffs, at Overstrand, near Cromer, 26th July, 1894; 4 males, attracted by her, were also shown; also a pair of Yorkshire *callunæ*, and a specimen taken flying over a heathy bit of land at Ringwood, Hants, probably in August, 1880. The date of this capture was uncertain, but Mr. Nicholson remembered that *Hipparchia semele* was on the wing, and in good condition, when the specimen was taken. This specimen united several of the characteristics supposed to distinguish *quercus* and *callunæ*. Also a series of one ♂ and six ♀, undoubted *callunæ*, bred from a female, captured at dusk, while ovipositing, flying along a grassy, herbage-covered bank between two fields, at Pwllheli, N. Wales, July 17th, 1895. There was no moorland or heathy ground near, and the land round about was only a foot or two above sea-level. The larvæ of both broods were hatched about the same time after the eggs were laid, and were treated in exactly the same way, being kept indoors in a warm room, and fed at first on willow, bramble, and hawthorn, and afterwards on privet and ivy, till full fed. The *quercus* pupated during January, 1895, and the first imago (a female) appeared on June 4th, 1895. The *callunæ* had all pupated before Christmas, 1895, and the first imago (a female) emerged April 4th, 1896. A good many larvæ of both broods died, and only about a dozen cocoons in each case were produced;

the *quercus* which did not emerge were found to be all males, and were apparently unable to escape from the pupæ; the *callunæ* which did not emerge were found not to have pupated at all, the larvæ having dried up in the cocoon. The cocoons of both broods were exactly similar in colour, but in each brood they varied from dark brownish-black to greyish; none were yellow. Mr. Nicholson did not notice any difference between the larvæ of the two broods in any stage; there was certainly no marked difference, and the ova were similar. Commenting on the material exhibited, Mr. Nicholson said that there did not seem to be a single character in the imago sufficiently constant, as far as he could see, to infallibly differentiate *quercus* from *callunæ*, or *callunæ* from *sparti*, although, generally speaking, the two latter seemed, on the whole, darker than *quercus*, and more closely allied to each other than to it. It seemed to him that the three so-called species were, in all probability, simply local or racial varieties of one species, and Mr. Tutt's remarks would appear to confirm or, at any rate, strengthen this view. Mr. Prout stated that he had found a female *callunæ* (?) drying its wings on a plant of heather (*Calluna*), at the end of July, 1894, near Lyndhurst. Mr. Horne (of Aberdeen) sent for exhibition a representative series of Aberdeenshire *callunæ*, consisting of eight males and ten females. Two of the males were of a dark buff colour, with the usual markings rather darker buff. These were justly admired. Mr. Bayne asked if anyone knew whether there was any form corresponding to *callunæ* found in mountainous localities on the Continent. Mr. Warburg said he thought Millière would have described it, if such a form existed. Mr. Tutt, however, stated most distinctly that *B. callunæ* occurred in the mountainous districts of Southern Europe. He said that he captured a larva in August, 1894, on Mont de la Saxe (above Courmayeur), that it spun in due course the following month, and produced a fine typical female *callunæ* the following summer. Mr. Bacot exhibited specimens, and read the following notes:—"2 ♂s. Pupæ received from Aberdeen Nov. 1894, emerged June, 1895, as typical *callunæ*. 2 ♀s. Larvæ taken on Exmoor, Aug., 1890, hibernated as pupæ and emerged May, 1891, one a cripple, the other a pale *callunæ* form. 1 ♀. Taken on Lundy Isle, Devon, Aug., 1887 (typical *quercus*). 1 ♀. Larva taken at Folkestone, Aug., 1891, hibernated as pupa and emerged the following year, in 1892 (? June), as typical *quercus*. 1 ♂. Taken at Lyme, Dorset, July, 1893 = typical *callunæ* upper side, tends rather to *quercus* coloration underneath. 1 ♂. Larva received from St. Anne's-on-Sea in May, 1892; emerged same year, and resembles the last. 1 ♂, 2 ♀s. Larvæ taken in Essex, May, 1894, emerged July, 1894, as typical *quercus*. The basal patch is probably a remnant of the inner or basal band, *B. trifolii*, representing a transition form between *callunæ* and *B. rubi*. It (the basal patch) appears to be present in nearly the whole of the *callunæ* exhibited, and is absent in all the *quercus*, save one specimen, exhibited by Mr. Prout, from Southend, and others from St. Anne's-on-Sea; none of Mr. Warburg's South of France *quercus* and *sparti* showing the slightest trace of this marking." Mr. Garland exhibited two female *Bombyx quercus*, bred from pupæ found at Eastbourne, the lower specimen being nearly colourless in the hind-

wings, but somewhat crippled; also two female *Polyommatus icarus*, the top specimen taken at Riddlesdown, 1896, the wings being of a brighter blue than usual; the second specimen, taken at High Beach, 1896, having the fore-wings splashed with streaks of white, and of a bright blue colour.

Nov. 17th, 1896. — INSECTS FROM WISBECH. — Mr. Oldham: 2 *Choerocampa elenor*, taken with other insects, flying round the flowers of *Cerasus iusitanica* (Portugal laurel) and honeysuckle, at Wisbech; also *Bombylius major* (the Bee-fly), from the same locality. *SPILOSOMA FULIGINOSA*. — Mr. S. J. Bell: a bred series of *Spilosoma fuliginosa*, from Yorkshire ova, one slightly malformed specimen showing a tendency towards yellow, instead of red, on the hind-wings. SECOND BROOD OF *ARCTIA CAIA*. — Mr. Bate: specimens of a second brood of *Arctia caia*, bred by himself and Mr. Shields from eggs laid by a female, taken at Woodford, Essex; in most of the specimens the red on the hind-wings was more or less tinged with yellow, and in one female the red was almost entirely replaced by yellow. *ENNOMOS AUTUMNARIA*. — Mr. Garland: 3 ♂ and 2 ♀ *Ennomos autumnaria*, bred by himself from larvæ obtained from Messrs. J. and W. Davis, of Dartford, who reared them from eggs, laid by a Deal specimen; also cocoon, pupa-shell and eggs of the species; the latter strongly resembled those of *E. quercinaria* as regards shape, colour, and manner of deposition. *TEPHROSIA CREPUSCULARIA* (*BIUNDULARIA*) and *T. BISTORTATA* (*CREPUSCULARIA*). — Mr. Tutt exhibited a very fine series of *T. biundularia*, captured by Dr. Corbett, in the neighbourhood of Doncaster, in May and June (1893-1895). The specimens exhibited a very wide range, from the whitish typical form, to the dark ab. *delamerensis*; also, for comparison, a series of *Tephrosia bistortata* var. *abietaria*, Haw., taken by Mr. Mason, of Clevedon, Somerset, in March, 1894-1895, and a series of the second brood form of *T. bistortata*, var. *consonaria*, St., bred in June last, by himself, from Clevedon eggs. *ORRHODIA VACCINII*, AB. *OBSCURA*. — Mr. Tutt exhibited, on behalf of Dr. Riding, some dark specimens of *D. vaccinii*, and pointed out how parallel the variation appeared to run with that of *O. erythrocephala* ab. *glabra*. *PLUSIA BRACTEA* BRED IN AUTUMN. — Mr. Tutt then exhibited a series of *Plusia bractea*, bred by Mr. J. Finlay, of Morpeth, from eggs laid in July last, the larvæ having been forced in order to procure autumnal specimens. He also exhibited a specially dark aberration of *Polia chi* ab. *olivacea*, taken at Morpeth, by the same gentleman. NEW ZEALAND PSYCHID. — Mr. Tutt also exhibited some cases of a Psychid (*Liothula omnivora*) which he had received from Mr. W. W. Smith, of Ashburton, New Zealand. This appeared to be the nearest approach to the "basket worms" (described in *Ent. Rec.*, vol. vii. No. 6) found in that country. HYBRID *SMERINTHUS OCELLATUS-POPULI*. Mr. Bacot, on behalf of himself and Mr. J. A. Clark: 3 hybrids between *Smerinthus ocellatus* and *S. populi*, bred by them; also the parents, and typical specimens of each species. Mr. Bacot read, "Notes on hybrid *Smerinthus ocellatus-populi*," illustrating his remarks by means of the specimens exhibited, and drawings of the genitalia, prepared by Mr. F. N. Pierce, of Liverpool, and kindly lent for the occasion.

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RHOPALOCERA.

Super-family : **HESPERIDES.**

Family : HESPERIDÆ.

Sub-family : HESPERINÆ.

Tribe : *Hesperidi.*

Nisoniades, Hb., tages, L.

Syrichthus, Bdv., malvæ, L.

Tribe : *Pamphilidi.*

Pamphila, Fab., sylvanus, Esp.
comma, L.

Thymelicus, Hb., actæon, Esp.
lineola, Ochs.
thanmas, Hufn.

Tribe : *Cyclopidi.*

Carterocephalus, Ld., palæmon, Pall.

Super-family : **PAPILIONIDES.**

Division : **Lycænida.**

Family : LYCENIDÆ.

Sub-family : LYCENINÆ.

Tribe : *Chrysophanidi.*

Chrysophanus, Hb., dispar, Haw.
phleas, L.

Tribe : *Lycænid.*

Lycæna, Fab., arion, L.
Cupido, Schrk., minima, Fuess.
Nomiades, Hb., semiargus, Rott.
Polyommatus, Latr., corydon, Poda
bellargus, Rott.

icarus, Rott.

astrarche, Bgstr.

Plebeius, Linn., ægon, Schiff.

Everes, Hb., argiades, Pall

Cyaniris, Dalm., argiolus, L.

Lampides, Hb., boetica, L.

Tribe : *Theclidi.*

Callophrys, Billberg, rubi, L.

Zephyrus, Dalm., quereus, L.
betulæ, L.

Thecla, Fab., w-album, Kn.
pruni, L.

Family : LEMONIIDÆ.

Sub-family : NEMEOBINÆ.

Tribe : *Nemeobiidi.*

Nemeobius, St., lucina, L.

Division : **Papilionida.**

Family : PAPILIONIDÆ.

Sub-family : PAPILIONINÆ.

Tribe : *Papilionidi.*

Papilio, Linn., machaon, L.

Family : PIERIDÆ.

Sub-family : PIERINÆ.

Tribe : *Aporidi.*

Aporia, Hb., cratægi, L.

Tribe : *Pieridi.*

Pieris, Schrk., brassicæ, L.

rapæ, L.
napi, L.
daplidice, L.

Tribe : *Anthocaridi*.

Euchloë, Hb., cardamines, L.
Leucophasia, St., sinapis, L.

Tribe : *Rhodoceridi*.

Colias, Fab., hyale, L.
edusa, Fab.
Gonepteryx, Leach, rhamni, L.

Family : NYMPHALIDÆ.

Sub-family : NYMPHALINÆ.

Tribe : *Argynnidi*.

Dryas, Hb., paphia, L.
Argynnis, Fab., lathonia, L.
adippe, L.
aglaia, L.
Brenthis, Hb., euphrosyne, L.
selene, Schiff.

Tribe : *Melitacidi*.

Melitæa, Fab., athalia, Rott.
cinxia, L.
aurinia, Rott.

Tribe : *Vanessidi*.

Vanessa, Fab., io, L.
Eu Vanessa, Scud., antiopa, L.
Aglais, Hb., urticae, L.
Eugonia, Hb., polychloros, L.
Polygonia, Hb., c-album, L.

Pryameis, Hb., cardui, L.
atalanta, L.

Tribe : *Nymphalidi*.

Limenitis, Fab., sibylla, L.
Sub-family : DANAINÆ.

Tribe : *Danaidi*.

Anosia, Hb., archippus, L.
Family : SATYRIDÆ.
Sub-family : APATURINÆ.

Tribe : *Apaturidi*.

Apatura, Fab., iris, L.
Sub-family : SATYRINÆ.

Tribe : *Parargidi*.

Pararge, Hb., megæra, L.
egeria, L.

Tribe : *Hipparchiidi*.

Hipparchia, Fab., semele, L.
Sub-family : EREBINÆ.

Tribe : *Epinephelidi*.

Epinephele, Hb., janira, L.
tithonus, L.

Tribe : *Coenonymphidi*.

Coenonympha, Hb., tiphon, Rott.
pamphilus, L.

Enodia, Hb., hyperanthus, L.

Tribe : *Erebiidi*.

Erebia, Dalm., athiops, Esp.
Melanpias, Hb., epiphron, Knoch.
Melanargia, Meig., galatea, L.

Recent Alterations in the British List for Labelling.

Citria, Hb.

flavago, Fab.

fulvago, Linn.

Tiliacea, Tutt.

citrago, Linn.

aurago, Fab.

Mellinia, Hb.

gilvago, Esp.

ocellaris, Bkh.

circellaris, Hufn.

Xanthia, Hb.

paleacea, Esp.

Family : APATELIDÆ.

Sub-family : ACRONYCTINÆ.

Tribe : CUSPIDI.

ACRONICTA, Ochs.

LEPORINA, Linn.

APATELA, Hb.

ACERIS, Linn.

CUSPIDIA, Chapn.

MEGACEPHALA, Fab.

HYBOMA, Hb.

STRIGOSA, Fab.

TRIENA, Hb.

PSI, Linn.

TRIBENS, Schiff.

JOCHÆERA, Hb.

ALNI, Linn.

Tribe : VIMINIDI.

PHARETRA, Hb.

AURICOMA, Fab.

MENYANTHIDIS, View.

EUPHORBIÆ, Fab.

var. MYRICÆ, G.

RUMICIS, Linn.

ALBOVENOSA, Göze.

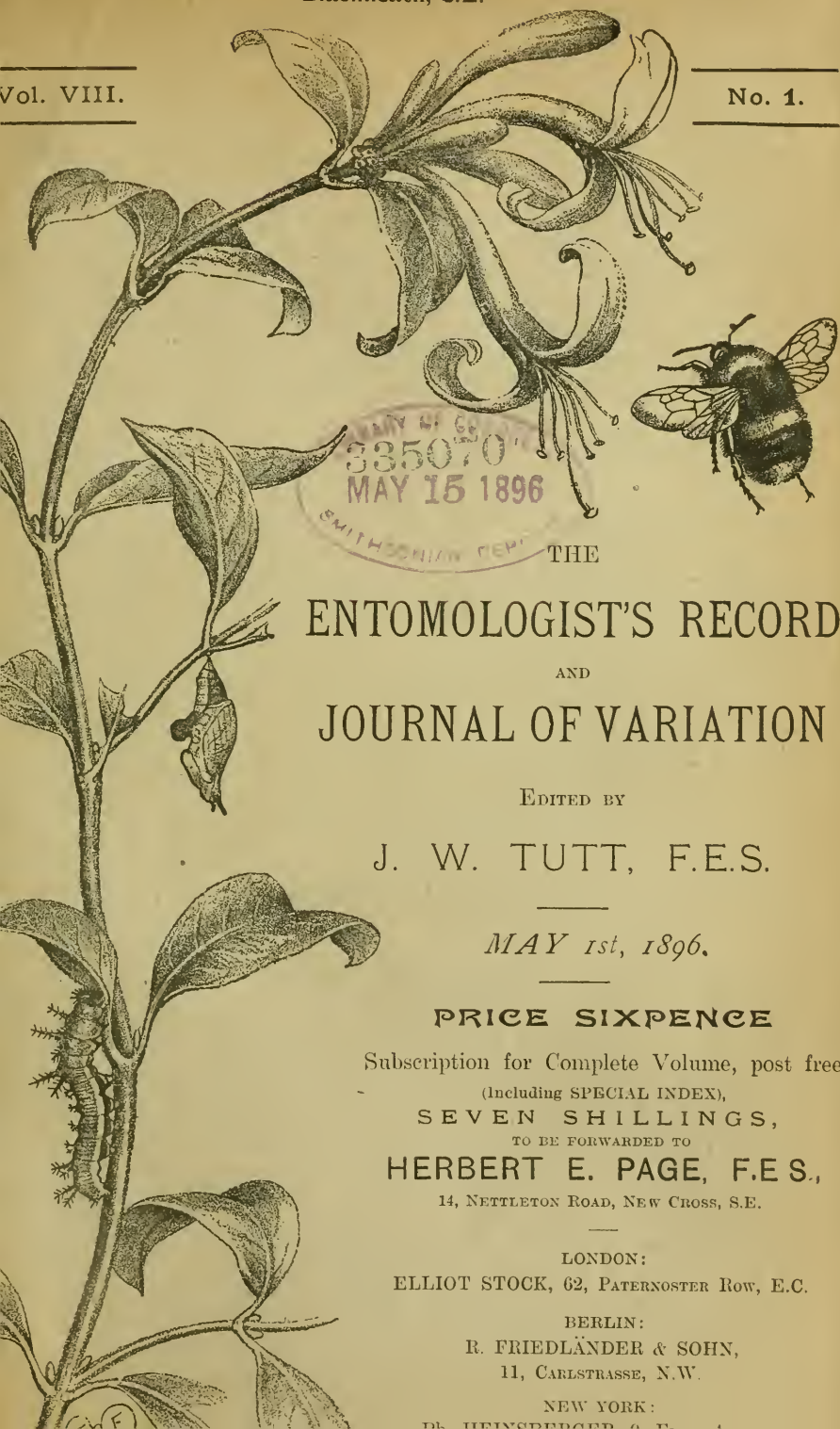
Tribe : BISULCIDI.

CRANIOPHORA, Snell.

LIGUSTRI, Linn.

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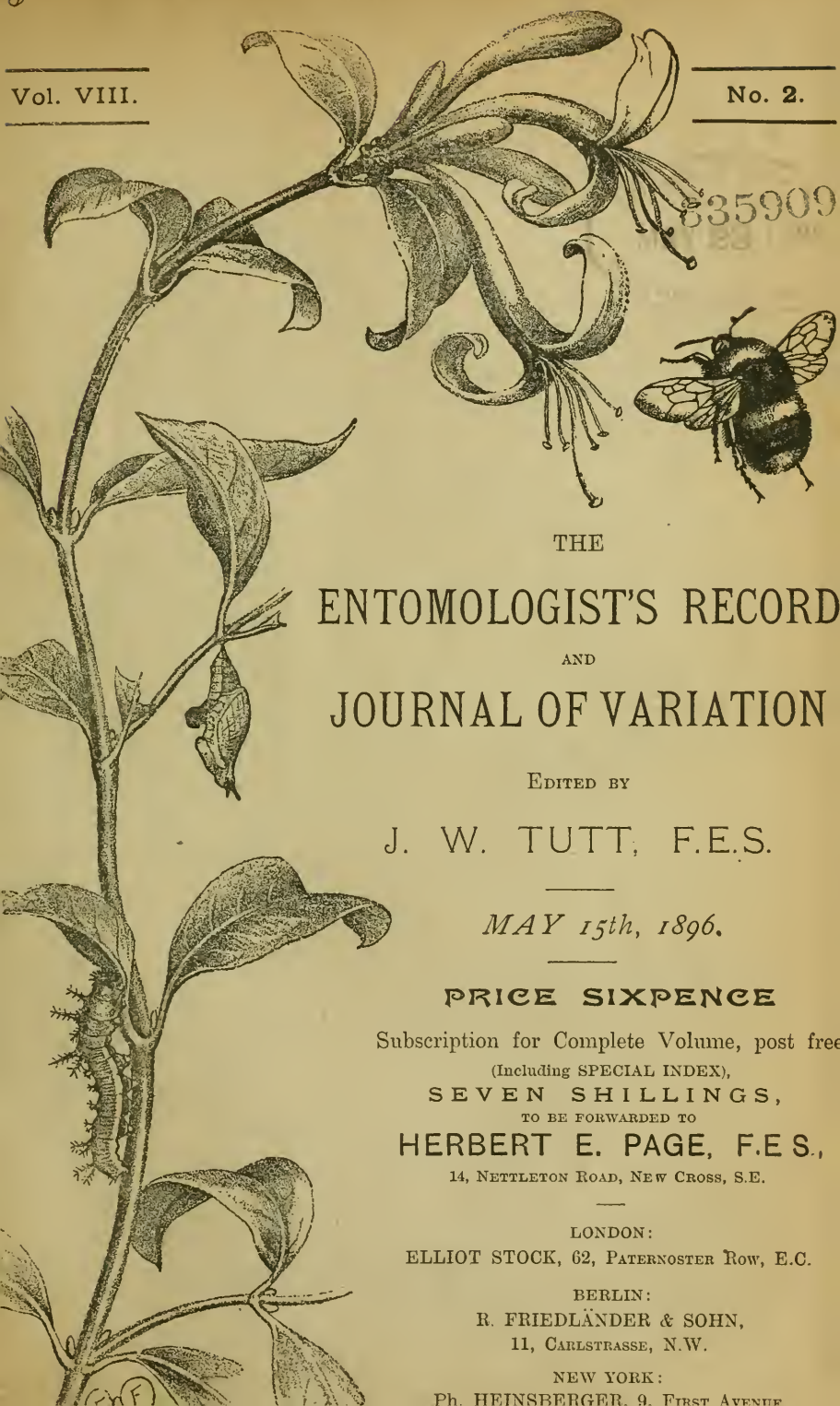
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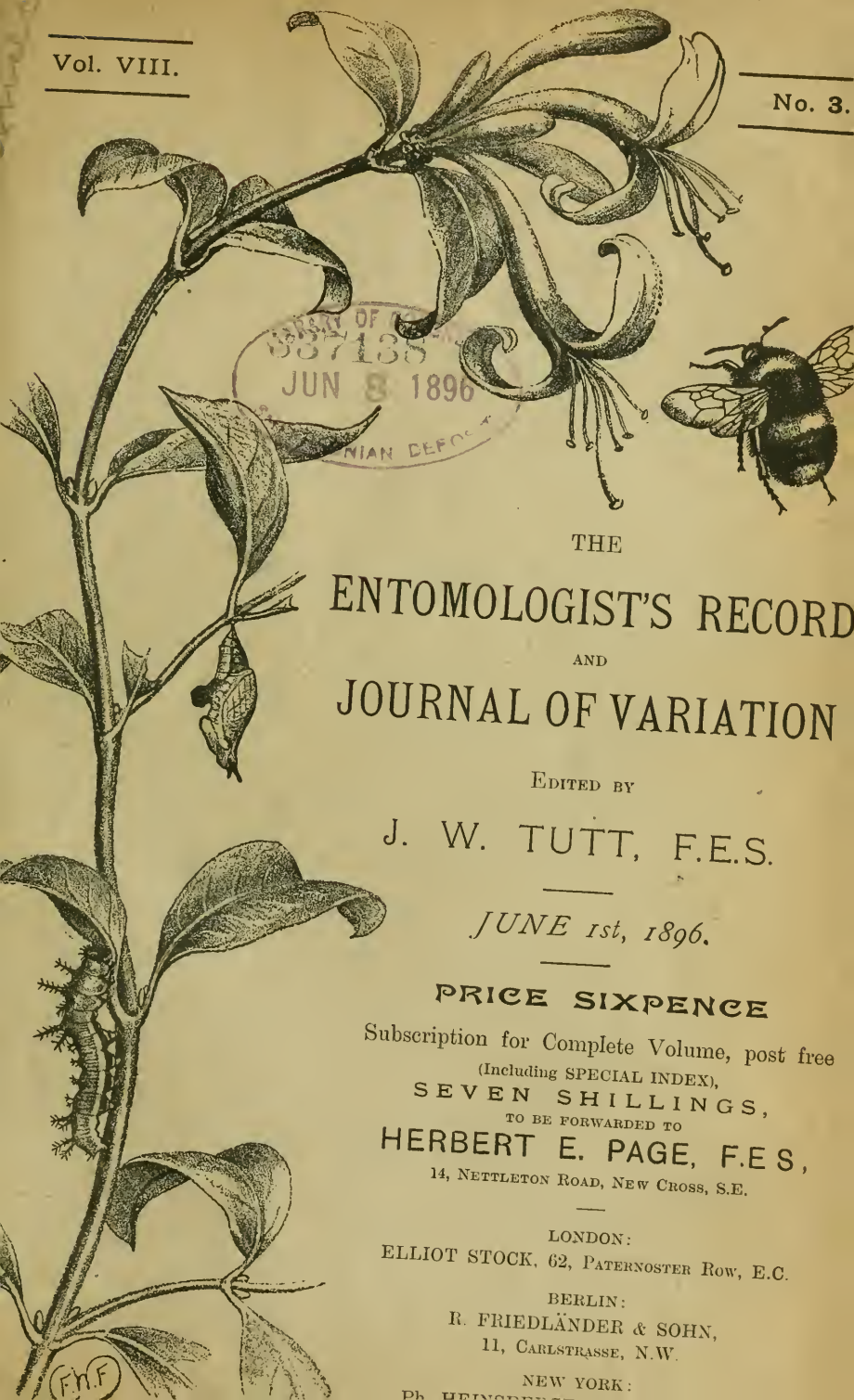
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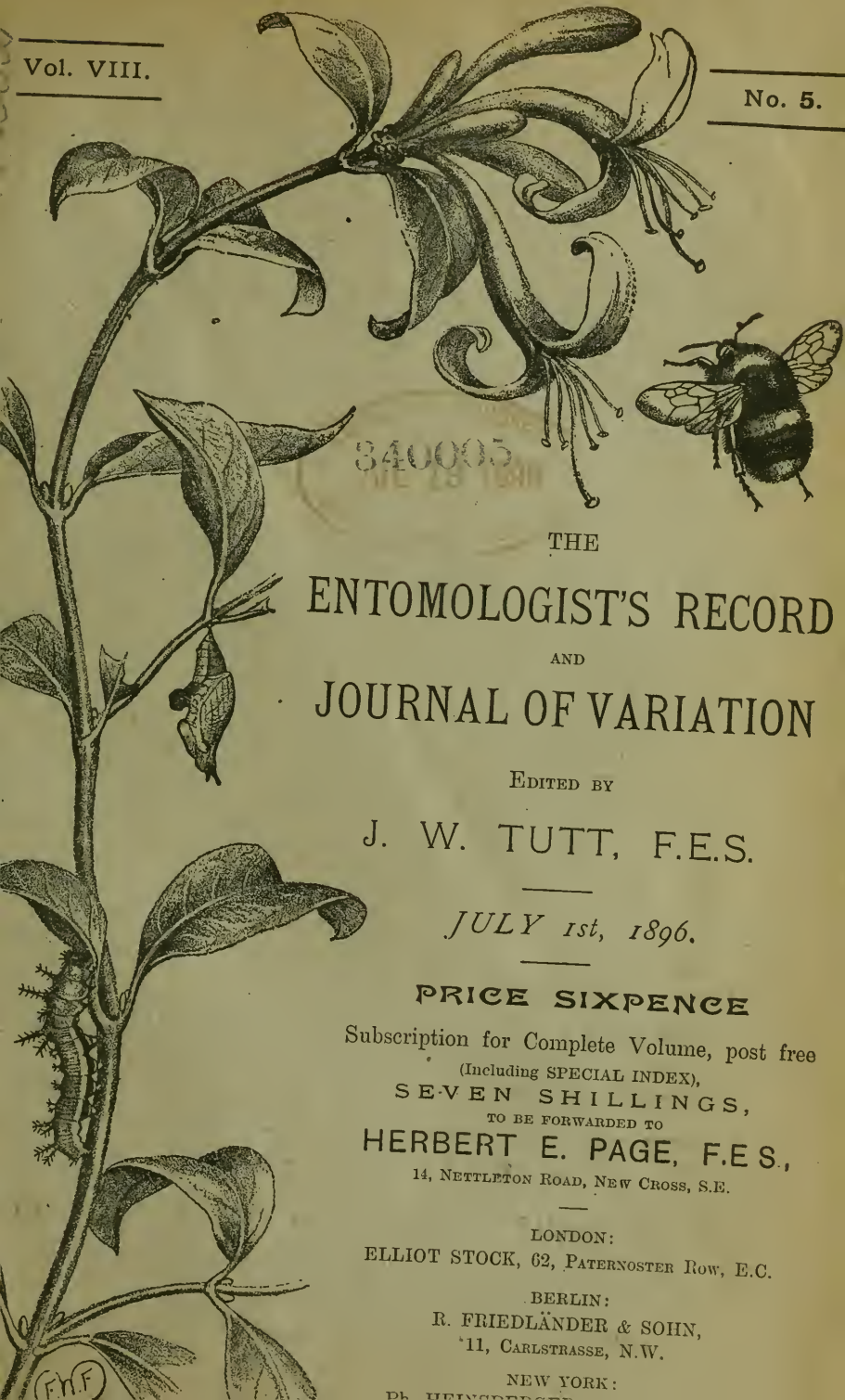
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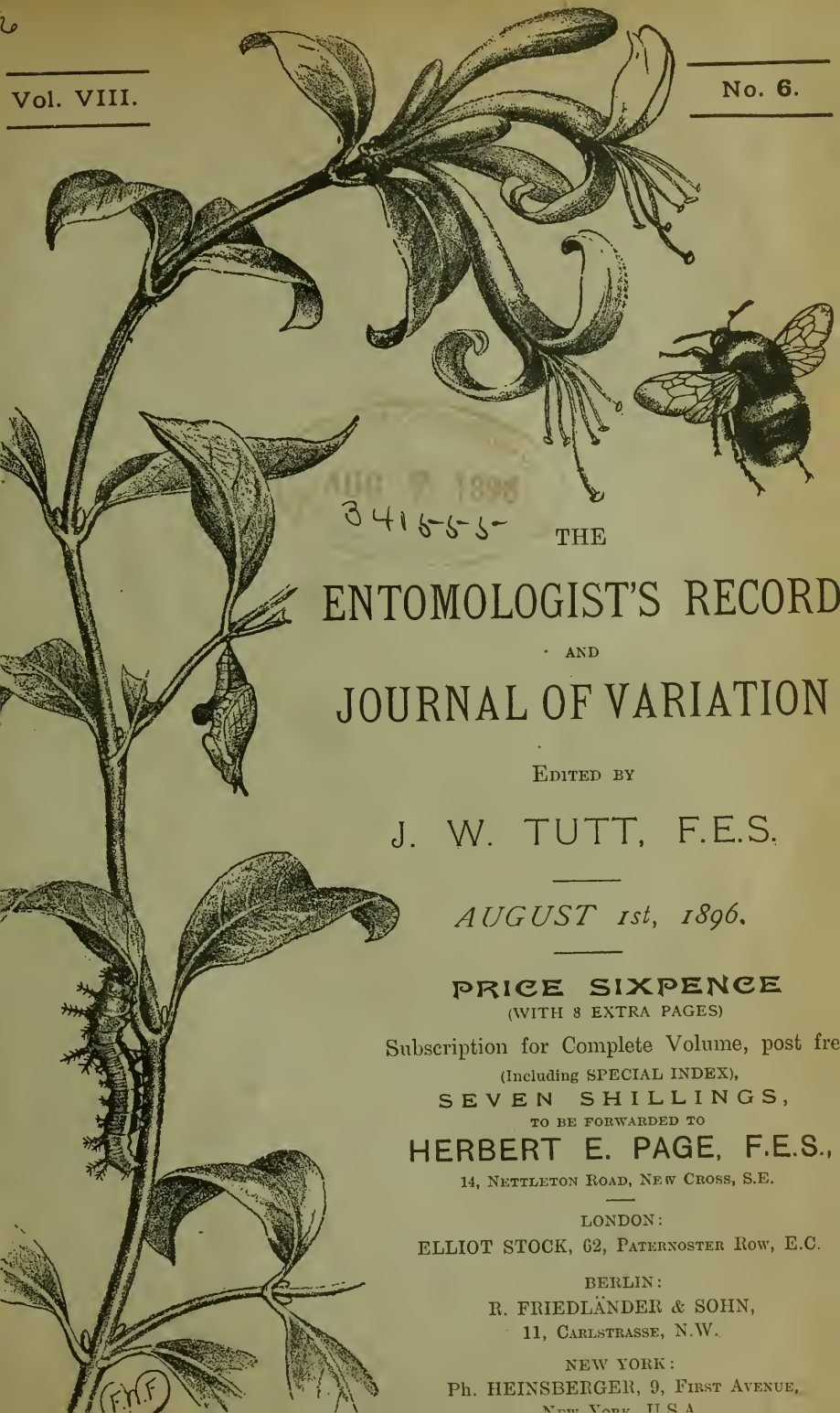
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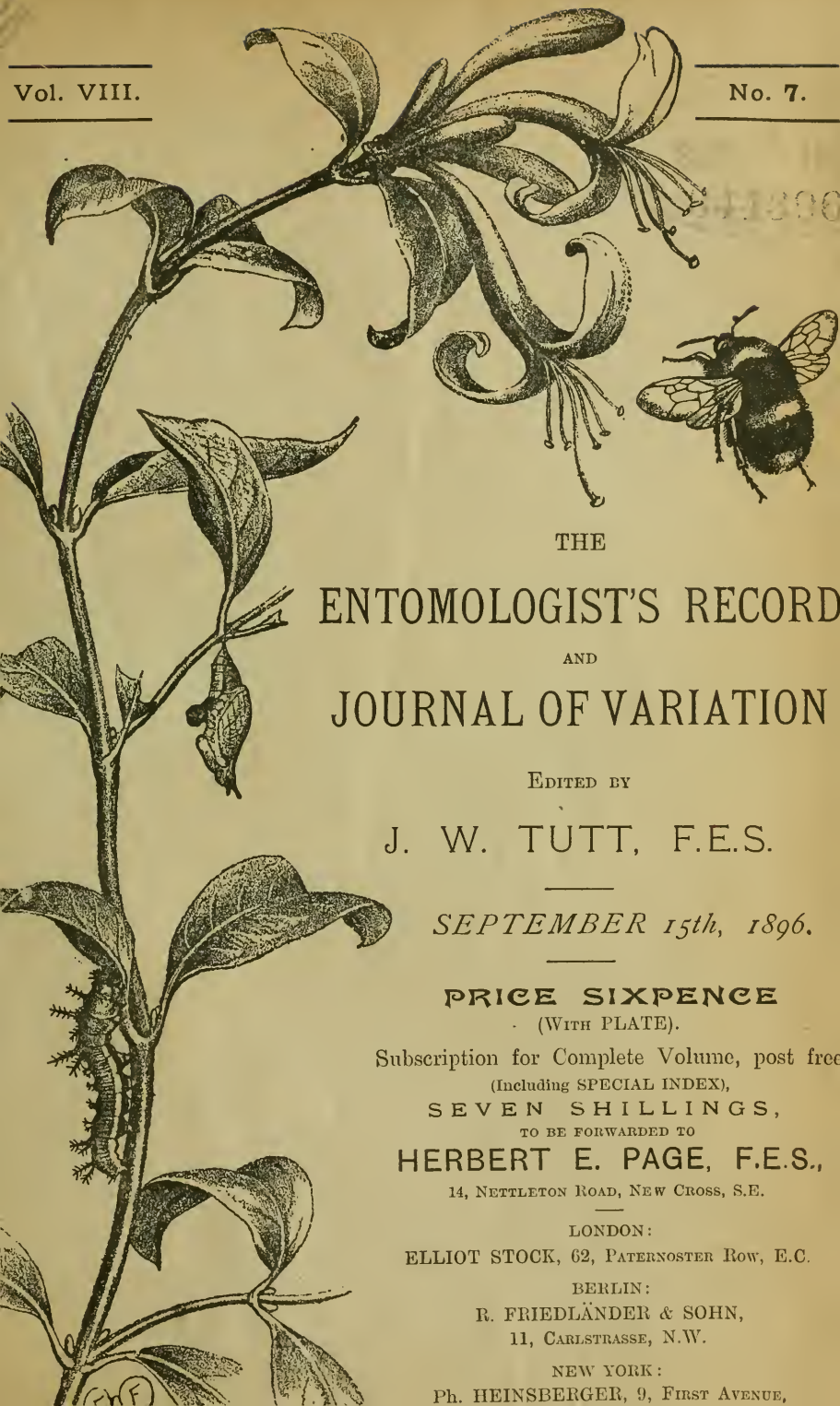
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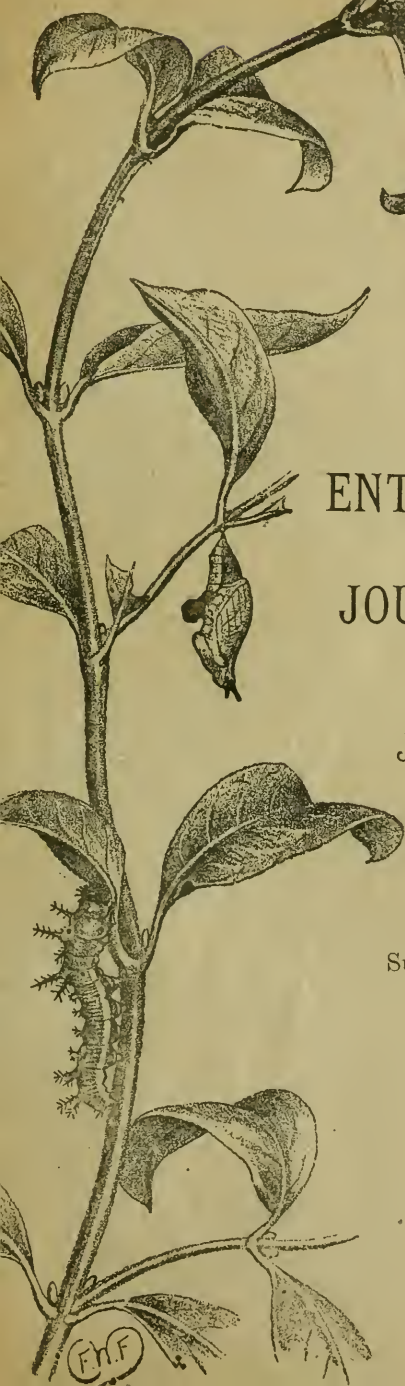
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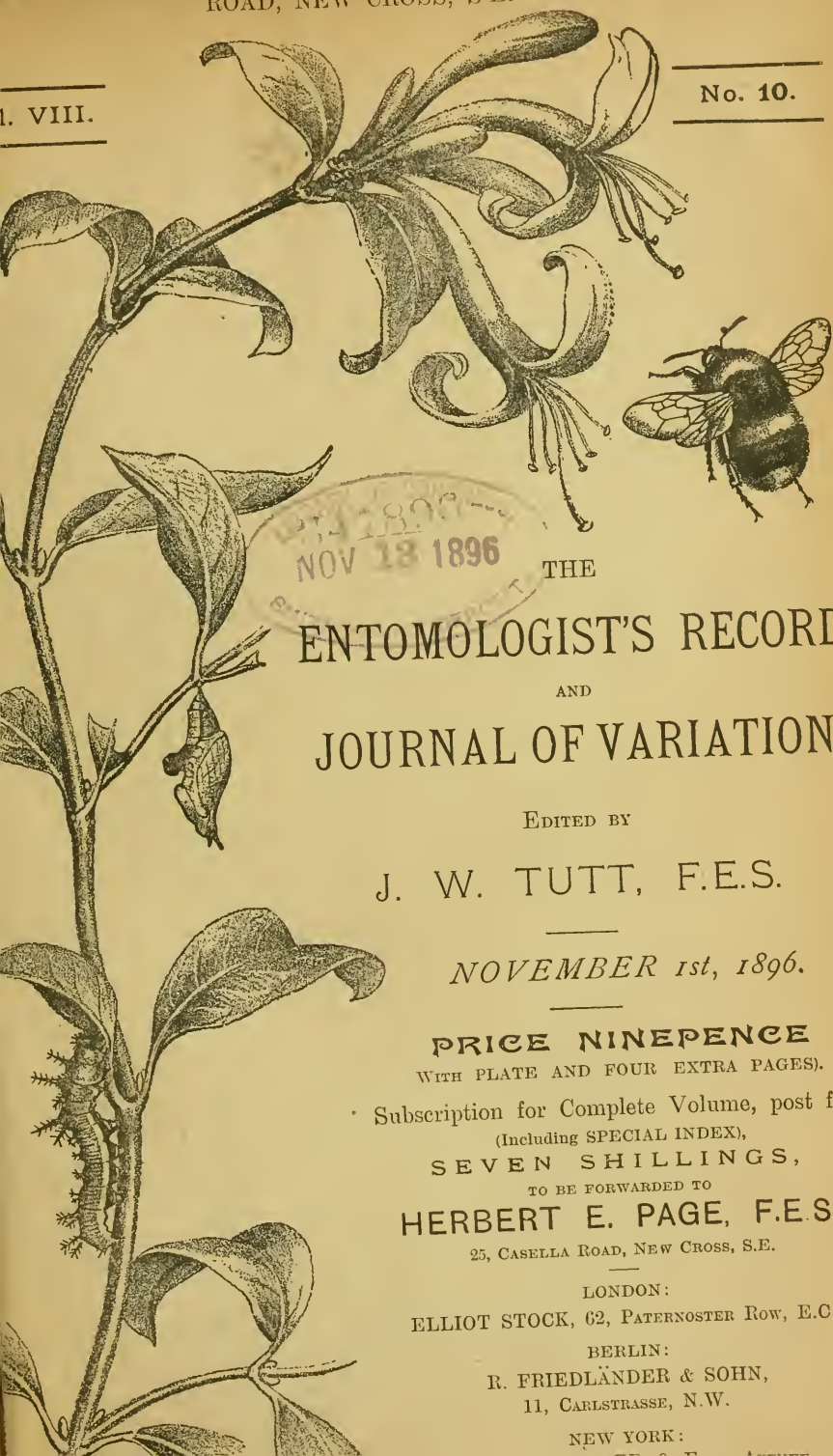
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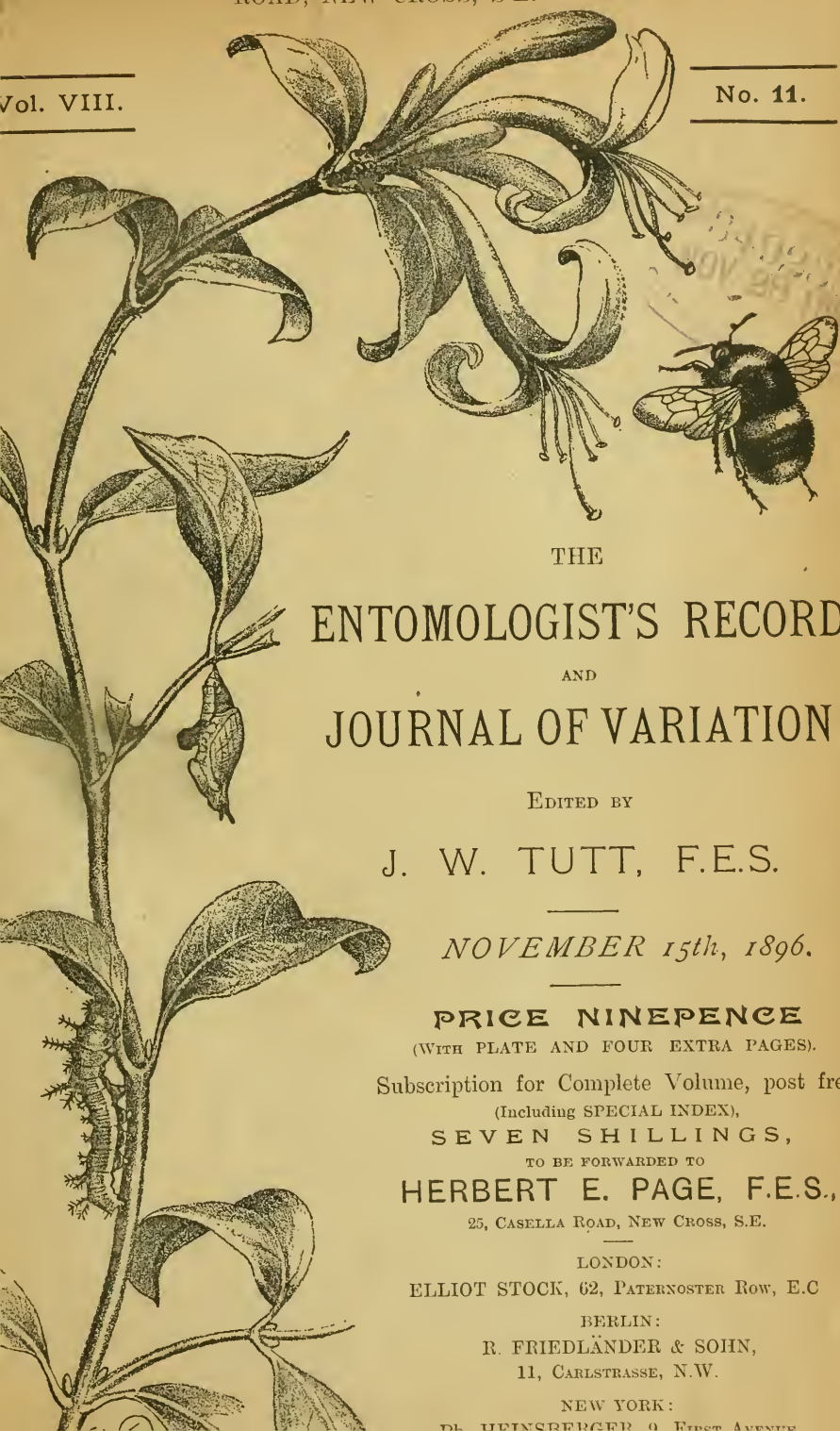
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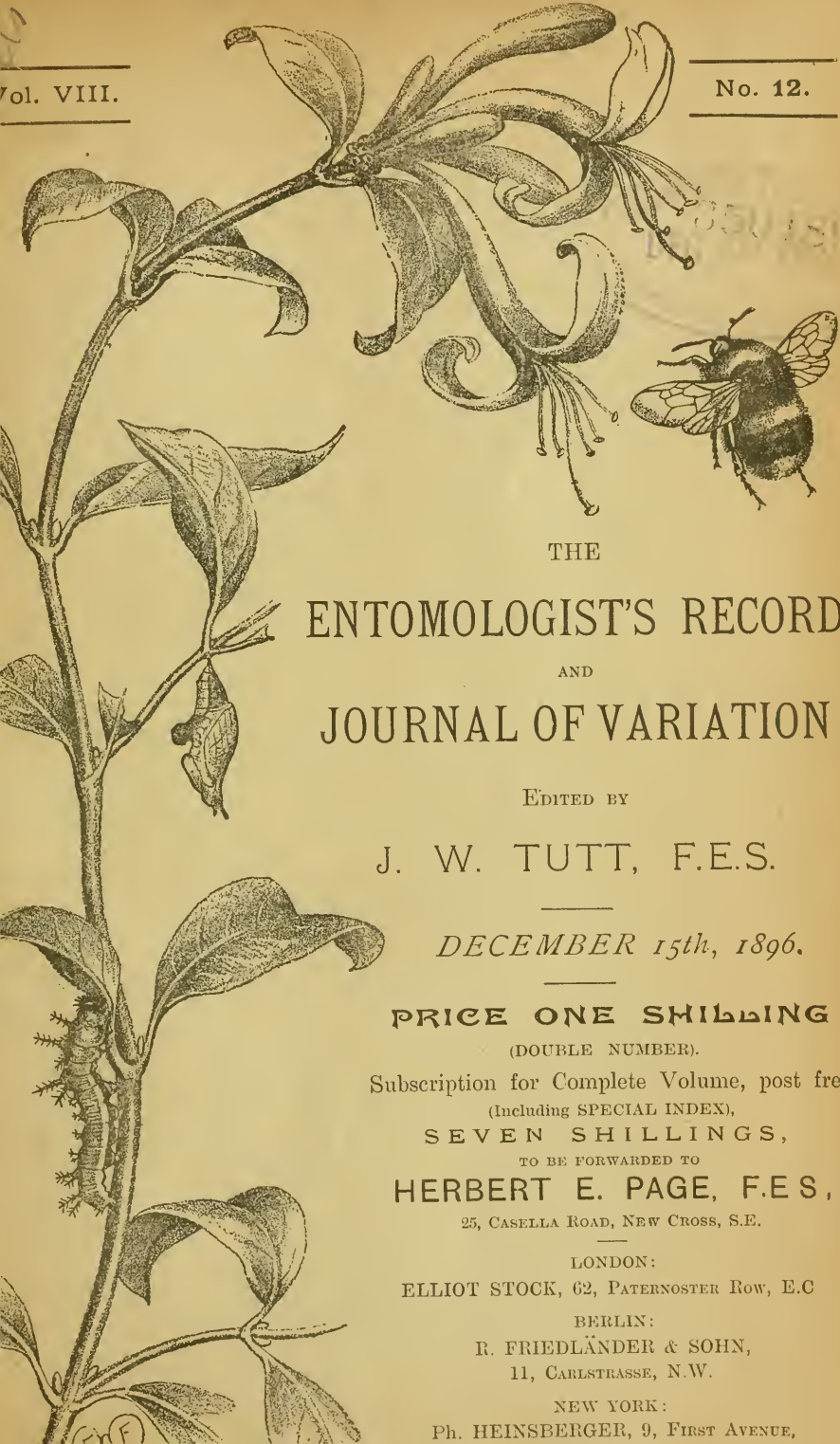
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EXCHANGE BASKETS.—Nov. 2nd, No. 1.—Messrs. Mousley, Christy, Page, Bayne, Norgate, Bowles, Buchan, Studd, Mason, Fenn, Moberly, Finlay. Oct. 23rd, No. 2.—Messrs. Moberly, Cheeseman, Studd, Finlay, Christy, Ash, Maddison, Mason, Brown, Richardson, Bowles, Mera, Webb. Nov. 2nd, No. 3.—Messrs. Beadle, Walker, Robertson, Whittle, Horne, Riding, Atmore, Hamm, Corbett, Finlay, Richardson. Nov. 14th, No. 4.—Messrs. Fox, Robertson, Warburg, Ash, Cannon, Webb, Christy, Hall, Robinson, Riding. Oct. 31st, No. 5.—Messrs. Norgate, Fenn, Broughton, Fox, Robertson, Dalglish, Mason, Williamson, Studd, Maddison, Whittle.

Desiderata (for cash).—Eggs or young larvæ (the younger the better) of the following species from the warmer parts of Italy, etc.:—*Machaon** (from spring parents), *Daphnide*, *Belia*, *Edusa*, *Cleopatra*, *Phlæas*,* *Egea*,* *Syllius*, *Egeria*, *Urticæ* (if approaching the *ichnusa* form). From 100 to 200 of each species desired and, where practicable, from the same parent. Such as will form only summer pupæ (*i.e.*, non-hibernating pupæ) by far the more desirable. Those marked thus * specially wanted.—*F. J. Merrifield*, 24, *Vernon Terrace, Brighton*.

Duplicates.—*Dahlii*, *Ravida*, *Xerampelina*, *Suspecta*,* *Cordigera*, *Trepidaria*, *Lobulata* (banded), *Gothiceina*, *Chi*, *Ulmata*,* *Falcula*,* *Flavicornis*, *Piniperda*, *Adesta*, *Instabilis* (*vars.*), *Rubricosa*, *Nigricans*, *Blandiata*, *Strobilana*. *Desiderata.*—Fine to renew (on black pins).—*W-album*, *Alsus*, *Agestis*, *Argiolus* ♀, *Alveolus*, *Sylvanus*, *Comma*, *Actæon*, *Aureola*, *Helveola*, *Quadra*, *Complana*, *Bombyliformis*, *Myopæformis*, *Fornicæformis*, *D. pinastri*, *Scolopacina*, *Aceris*, *Grossulariata* (*r rs.*) and others.—*T. Maddison*, *South Bailey, Durham*.

Duplicates.—Ova of *Autumnaria* (*Alinaria*), and pupæ of *Strataria* (*Prodromaria*).—*Desiderata.*—*Exulans*, *Præcox*, also numerous ova and pupæ. Only fine and medium set insects accepted, with data and locality. Black pins.—*G. R. Garland*, 94, *Sedgwick Road, Leyton, Essex*.

WANTED.—A copy of the "Lepidopterist's Calendar," by Joseph Merrin. Cash or exchange.—*G. R. Garland*, 94, *Sedgwick Road, Leyton, Essex*.

Duplicates.—*Zonaria*, *Edusa*, *Tipuliformis*, *Reclusa*,* *M. rubiginata* (Irish), *Castrensis* ♀,* *Margaritellus* (Irish), *Ulmata* (I. of Man),* *Ypsilon*,* *Desiderata.*—Ova: *Monacha*, *P. populi*, *Apiciaria*. Pupæ: *Pictaria*, *Dolobraria*, *Porata*, *Punctaria*, *Afinitata*, *Pumilata*, *Coronata*, *Albicillata*, *Rivata*, *Pulveraria*, *Ridens*, *Tridens*, *Pinastri*, *Putris*, *Adesta*, and many others.—*Colonel Partridge*, 20, *Hornsey Rise Gardens, Crouch End*.

Desiderata.—Live cocoons of Asiatic Saturniids wanted. Address with price to—*A. R. Grote*, *Roemer Museum, Hildesheim, Germany*.

Duplicates.—Lineola, Turca, Absinthii, Carpophaga, Dysodea, Cuprealis, Sticticalis, Ciliaris, Decrepitalis, Myellus, Palealis, etc. *Desiderata*.—Rubrotibiella, Ficella, Semirufa, Hieracii, etc.—*J. B. Hodgkinson, Rosebery House, Ashton-on-Ribble.*

Duplicates.—Arion, Galii, Strigosa, Auricoma, Subsequa, Nigrocincta, Erythrocephala, Scrophulariæ, Sicula, Bractea, Reticulata, and others (two each). *Desiderata*.—Ambigua, Lappanaria, Gemmiferana, Ocellaris.—*J. B. Hodgkinson, Rosebery House, Ashton-on-Ribble.*

Duplicates.—Irish: Sinapis, Argiulus, Aurinia,* Hyperanthus, Egeria, Paphia, Urticæ,* Napi, Rapæ, Alexis, Io,* Brassicæ,* Cardamines, Janira, Prunaria, Populata, Montanata, Mensuraria, Cratægata, Crepuscularia, Repandata, Elutata, Chærophyllata, Atomaria, Lunaria, Hectus, Russula ♂, Festiva, Gemina, Pronuba (vars.), Gothica (vars.), Cruda, Oculea, Litura, Nebulosa, Orbona, Strigilis, Polyodon, Meticulosa, Blanda; English: Comma, Polychloros, Corydon, Adonis, Testudo, Lubricipeda. *Desiderata*.—Numerous. (Rev.) *W. W. Fleming, Coolfin, Portlaw, co. Waterford.*

Duplicates.—L. comma, Morpheus, Rumicis,* Testacea, Gemina, Nigricans, Typica, Litorosa, Augur, Impura, Lubricipeda,* Flavago,* Nictitans, Oculea, Albulata, Populata, Jacobææ. *Desiderata*.—Hyale, Betulæ, W-album, Pruni, Minima, Argiulus, Ægon, Astrarche, Lucina, Sibylla, Aurinia, Cinxia, Epiphron, Egeria, Actæon, Palæmon, and many others.—*T. Ashton Lofthouse, The Croft, Linthorpe, Middlesbrough.*

Duplicates.—Aglaiæ, Sylvanus, Loniceræ,* Jacobææ,* Dispar,* and ova of Monacha, Potatoria,* Cæruleocephala,* Comma, Impura, Palleus, Phragmitidis, Ochræa,* Testacea, Basilinea, Gemina, Strigilis, Nigricans, Plecta,* C-nigrum,* Umbrosa, X. flavago,* Libatrix,* Venosata,* Sociata,* Vetulata.* *Desiderata*.—Very numerous.—*J. W. Boulton, 9, Finsbury Grove, Fountain Road, Hull.*

Duplicates.—Mundana, Jacobææ, Fuliginosa, Maculata, Pilosaria, Piniaria, Ulmata, Aurantiaria, Boreata, Dilutata, Decolorata, Olivata, Nanata, Rubiginata, Albicillata, Immanata, Flavicornis, Perla, Rubricosa, Suspecta, Trapezina, Chi, Flavicincta, Oxyacanthæ, Aprilina, Glaucia. *Desiderata*.—Other common insects.—*A. Broadley, 20, Carleton Street, Keighley.*

Duplicates.—Edusa ♂, Paphia, Sibylla, Argiulus, Corydon, Ligustri,* Populi,* Elpenor,* Fibrosa, Sponsa,* Pyramidea, Saucia,* Libatrix,* Verbasci,* Illunaria var. Juliaria,* Citraria ♂,* Rectangulata,* Testata.* All fine, on black pins. *Desiderata*.—Ova, larvæ, or pupæ only:—A. urticæ, Illustraria, Abruptaria, Pendularia, Derivata, Tersata, Vitalbata, Batis, Flavicornis, Menyanthidis, Piniperda, Rubricosa, Gracilis, Flavicincta, Thalassina, Falcula. Scotch or Irish Instabilis, and offers.—*J. W. Moore, 194, Stratford Road, Birmingham.*

Duplicates.—Lubricipeda var. Radiata* (intermediates), Menthastri var. Carbonica* (intermediates) Ochræa, Viminalis var. Obscura,* Russata* (black), Rhomboidaria* (black), Repandata* (black), Biundularia (dark), Pulveraria,* Sylvata, Tristata,* Suffumata,* Rubidata,* Comitata,* Subfulvata,* Templi (fair), Filigrammaria,* Connexa, Advenaria,* Dromedarius,* Hexapterata,* Prunata,* Hastata,* Sparsata, Fimbria,* Tortrices, &c.—*J. Harrison, 7, Gower Road, Barnsley.*

WANTED.—Eggs, larvæ and pupæ of butterflies and moths for description.—*J. W. Tutt, Westcombe Hill, S.E.*

Duplicates.—Aglaiæ, Selene, Blandina, Davus, Artaxerxes, Exulans, S. populi* (and pupæ), Velleda, Plantaginis,* Fascelina,* Fuliginosa var. Borealis,* T. cratægi,* Cal-lunæ* (and pupæ), Carpini* (and pupæ), Repandata (pale vars), Cæsiata, Olivata, Ericetata, Immanata (vars.), Suffumata, Populata, Pyraliata, Mensuraria, Dictæa (pupæ), Rurea and var. Alopecurus, Polyodon (black), Furva, Gemina, Litorosa, Tenebrosa, Nigricans, Tritici, Cursoria, Lucerneæ, Festiva (var.), Dahlii, Brunnea, Piniperda, Sus-pecta, Macilenta, Rufina, Litura, Vaccinii, Chi, Oxyacanthæ, Thalassina, Rectilinea, Solidaginis, Vetusta, Exoleta, Myrtilli, H. urticæ, Chrysitis, Festucæ, Pulchrina, Resi-nana,* &c. *Desiderata*.—Very numerous.—*Arthur Horne, 52, Irvine Place, Aberdeen, N.B.*

Duplicates.—Coleoptera, Orthoptera, Neuroptera, Hymenoptera, Lepidoptera, Hemip-tera, and Diptera personally collected in Sierra Leone. *Desiderata*.—Foreign Lepidoptera.—*W. G. Clements, Linden Cottage, Frindsbury, Rochester.*

Duplicates.—Perfect papered Diurnal Lepidoptera from United States, Central America and S. America, for papered Diurni from Malay Archipelago. S. A. Diurni also wanted.—*Levi W. Mengel, Reading, Pa., U.S.A.*

WANTED.—Larvæ or ova of any of the European LIPARIDÆ (except the common English species). Cash or exchange.—*A. Bacot, Bow House, St. James' Terrace, Clapton, N.E.*

Desiderata.—Eggs and larvæ of Bombycine moths are required for description by *Dr. A. S. Packard, Providence, R.I., United States, America.*

Change of Address.—*H. E. Page, to 25, Casella Road, New Cross, S.E.*

MEETINGS OF SOCIETIES.

Entomological Society of London, 11, Chandos Street, Cavendish Square, W.—Wednesdays:—Annual Meeting, Jan. 20th, 1897. Presidential address by Professor Meldola.

The City of London Entomological and Natural History Society, London Institution, Finsbury Circus, E.C.—The first and third Tuesdays in the month, at 7.30 p.m. Papers and Notes at every Meeting. Dec. 15th, "Pocket Box Exhibition." Members are particularly requested to bring varieties and aberrations. Non-members cordially invited.

The South London Entomological and Natural History Society, Hibernia Chambers, London Bridge.—The second and fourth Thursdays in each month, at 8 p.m. Jan. 14th, "Some Marine Mimics," by E. Step, F.L.S. "The Tephrosias," by W. Hewett. Jan. 28th, Annual General Meeting, at 7 o'clock. Presidential address by R. South, F.E.S.

North London Natural History Society. Meetings on the 2nd and 4th Thursdays in each month, in Room No. 4 of the North East London Institute, Dalston Lane, N.E., from 7.45 (sharp) to 10 p.m. Visitors are cordially invited. The Council have fixed Saturday, **Jan. 2, 1897**, for the Society's fifth Annual Exhibition. Intending exhibitors should communicate with **LAWRENCE J. TREMAYNE, Hon. Secretary**, 51, Buckley Road, Brondesbury. Jan. 2nd, Fifth Annual Exhibition. Jan. 14th, Presidential address.

Nonpareil Entomological Society, Mansfield Street, Kingsland.—The First and Third Thursdays in the Month. Visitors cordially invited.

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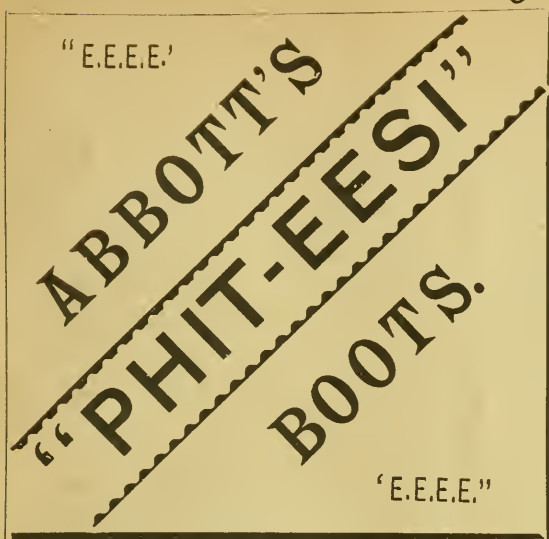
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VOL. VII.

The titles of some of the articles are as follows.—"The Resting Habit of Insects as exhibited in the Phenomena of Hibernation and Estivation."—*W. F. de V. Kane, M.A., F.E.S., W. S. Riding, B.A., M.D., F.E.S., J. W. Tutt, F.E.S.* "Some Aspects of Hibernation."—*Dr. F. A. Dixey, M.A., F.E.S.* "The Lepidoptera of Tenerife."—*Sidney E. Crompton, F.E.S.* "On the Development of Sex in Social Insects (a critique on Professor Weismann's views)."—*J. W. Tutt, F.E.S.* "On the Larva of Saturnia (with special reference to the American forms)."—*Professor A. R. Grote, M.A.* "The Lepidoptera of the Tyrol (Mendal Pass, Lejo, Campiglio)."—*F. C. Lemann, F.E.S., J. W. Tutt, F.E.S.* "On the British Species of *Smerinthus*."—*Professor A. R. Grote, M.A.* "On the Generic names in 'Apatela (Acronycta)'"—*Professor A. R. Grote, M.A., Dr. T. A. Chapman, F.E.S., L. B. Prout, F.E.S., J. W. Tutt, F.E.S.* "On *Anthracia mylitta*."—*Dr. T. A. Chapman, F.E.S.* "Hydracca lucens and *H. paludis*."—*T. Acton.* "On the Identification of *Acidalia dilutaria*, Hb."—*L. B. Prout, F.E.S.* "Cecura biensis as a Herefordshire insect."—*Dr. T. A. Chapman, F.E.S.* "On the Interbreeding of *Spilosoma mendica* and its var. *rustica*."—*J. W. Tutt, F.E.S.* "The Varieties of *Leucophasia sinapis*."—*Dr. W. S. Riding, B.A., F.E.S.* "On the Pupal suspension of *Thais*."—*Dr. T. A. Chapman, F.E.S.* "Differentiation of *Eupithecia sucenturiata* and *E. subfulvata*."—*R. Freer, M.B., W. G. Sheldon, L. B. Prout, F.E.S.* "Habits of *Callimorpha hera*, on the Continent."—*J. W. Tutt, F.E.S.* "Cenonympha typhon and its varieties (with a critical review of the synonymy)."—*F. J. Buckell, M.B., B.S.* "The hibernating stage of *Pyraeas cardui*."—*J. W. Tutt, F.E.S.* "The Coleoptera of Ipswich."—*Claude Morley, F.E.S.* "Sounds emitted by Lepidoptera."—*P. of. A. R. Grote, M.A.* "The early stages of the *Satyrinae*."—*J. W. Tutt, F.E.S.* "The larva of *Epischia banksiella*."—*N. M. Richardson, B.A., F.E.S.* "The wing clothing of the Lepidoptera."—*Prof. A. R. Grote, M.A.* "On the Basket Caterpillar of Argentine, and the Bazworm (Thyridopteryx ephemeriformis) of the United States" (with plate).—*J. W. Tutt, F.E.S.* "Lycena aegon var. *corsica* on the Westmoreland Mosses."—*Herbert Mussey, F.E.S.* "Sphinx pinastri in Suffolk."—*Hon. F. Thellusson.* "On *Noctua festiva*, Hb., and *N. confusa*, Tr."—*Frederick J. Hanbury, F.I.S., F.E.S.* "On the variation of *Melitaea aurinia*."—*W. F. de V. Kane, M.A., F.E.S., J. W. Tutt, F.E.S.* "The Introduction of *Callimorpha hera* into Britain."—*W. A. Luff.* "Life-history of *Thecla roboris*."—*W. E. Nicholson, F.E.S.* "Acalidia dilutaria, Hb. (holo ericata, Dap.) as a British insect."—*G. C. Griffiths, F.Z.S., F.E.S.* "Probable Specific Identity of *Sciaphila penziana* and *S. colquhouniana*."—*J. W. Tutt, F.E.S.* "The introduction of *Sphinx pinastri* into Suffolk."—*Rev. O. Pickard-Cambridge, M.A., F.E.S.* "The Genera in the sub-family *Lyceninae* applied to British species."—*J. W. Tutt, F.E.S.* "The relationship of *Endromis versicolor* to the *Sphingides*."—*A. Bicot, F.E.S.* "Some named varieties of *Larentiidae* (with critical notes on the synonymy)."—*L. B. Prout, F.E.S.* "How *Colias edusa* winters."—*J. W. Tutt, F.E.S.* "The Coleoptera of Lymington Salterns."—*Frank Bouskell, F.E.S.* "On *Alucita* (Ornesodes) *hexaleptyla*, chiefly in relation to the structure of the Pupa."—*Dr. T. A. Chapman, F.E.S.* "Calamia lutea, its variation, habits, etc."—*Rev. C. R. N. Burrows.* "Oporabia filigranularia, its variation, life-history, etc. (with plate)."—*J. A. Clark, F.E.S.* "The Coleoptera of Cromer and Horning."—*E. G. Elliman.* "Mesogona acetosellae: a Noctuid new to the British List; The re-occurrence of *Xylina lambda* in Britain; *Sphinx pinastri* as a British insect; On the dorsal spines of the larva of *Euvanessa antiopa*; The hibernating stage of *Dianthoea capsophila*; *Eudryas stae-johannis* (Professor J. B. Smith, D.Sc.); *Argyresthia illuminatella* and *A. atmorella* (E. R. Binkes, M.A., F.E.S., J. W. Tutt, F.E.S.); On the larva and rearing of *Polia xanthomista*; Aberrations of British Lepidoptera (with plate); The variation of certain Noctuids occurring near Montrose; On the Affinities of *Demas coryli*; On the Variation of *Xanthia fulvago*; Habits of the larva of *Coceyx cosmophorana*; On the Variation in colour of the Cocoons of *Saturnia pavonia*; The type of *Agronoma*; Description of the larva of *Acalidia dilutaria* (holosericata) (C. Fenn, F.E.S.); On the Food-plant of *Sciaphila colquhouniana* (Colonel Partridge); *Sirex juvenens* and *S. gigas* (C. W. Williams); *Cenonympha typhon* at home (J. E. Robson, F.E.S.); The Lepidoptera of Dalwich; Entomology, Evolution and Romance (F. W. Frost).

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